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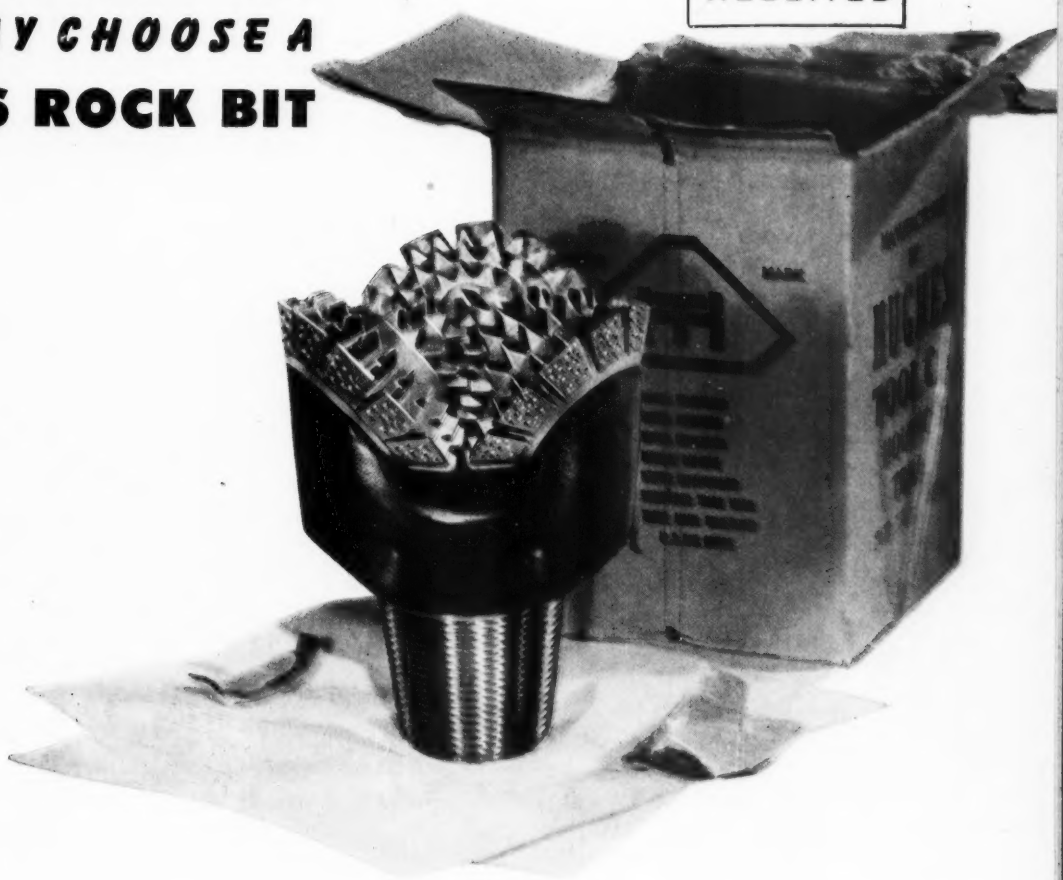

HUGHES TOOL COMPANY
HOUSTON, TEXAS
Standard of the Industry

PRICE 20 CENTS

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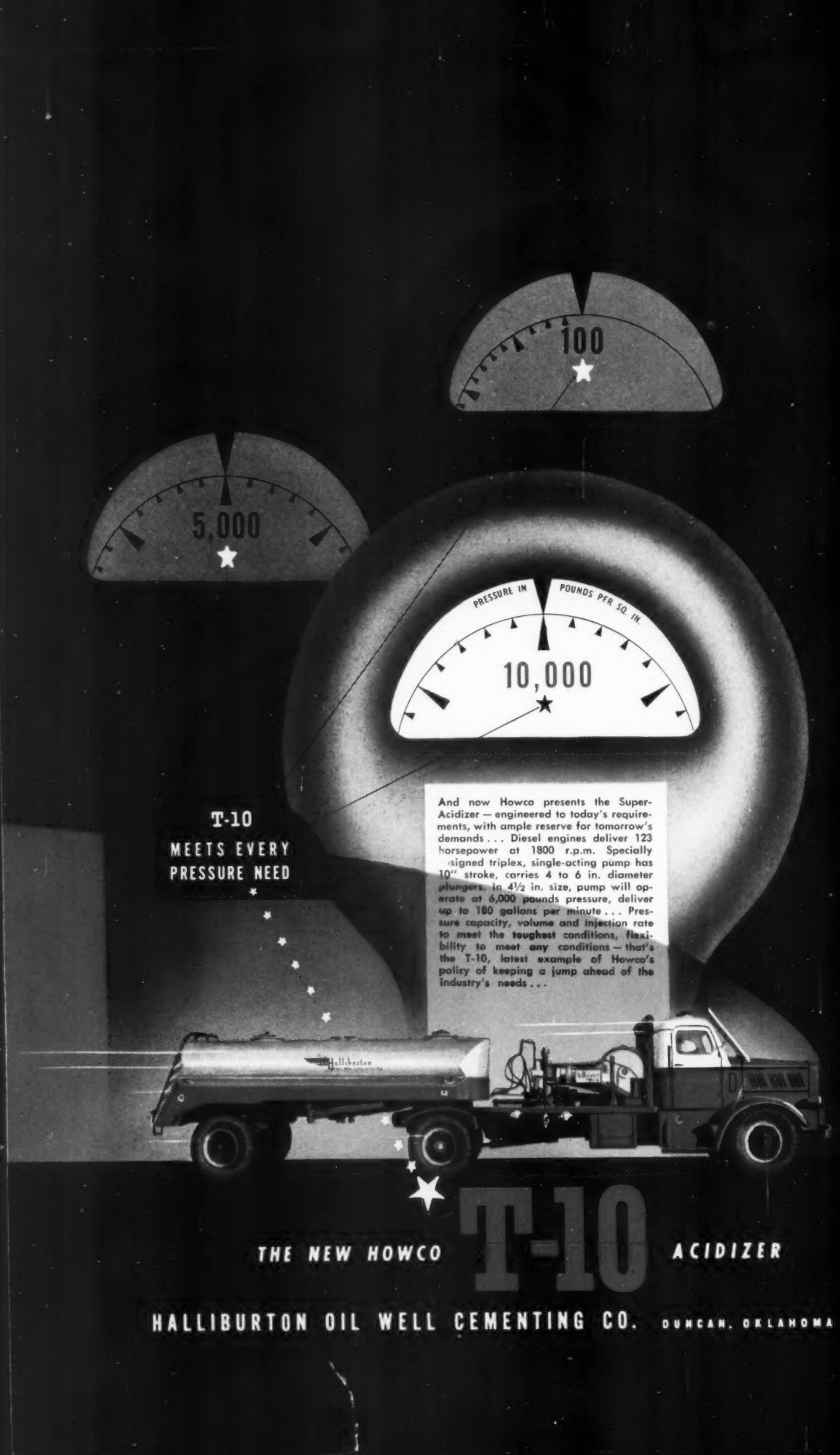
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211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

FOUNDED IN 1910 BY PATRICK C. BOYLE

Subscription rate to the petroleum industry, United States and foreign, 1 year, $3.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

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Vol. 47, No. 3 May 20, 1948

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ARE THESE THE QUESTIONS you would ask about any packer?

CAN IT BE DRILLED UP EASILY?—The Baker Retainer Production Packer is completely drillable. You will never have to "mill up" a Baker Packer.

DOES IT RESIST CORROSION?—Yes, the cast iron construction of the Baker Packer is far more resistant to corrosion than the steel casing in which it is set.

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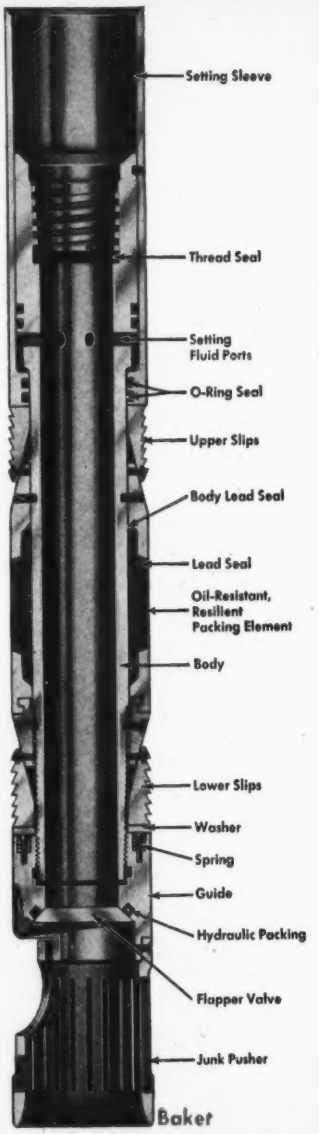

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THE OIL AND GAS JOURNAL

Equipment Byproduct

PRESIDENT W. G. SKELLY says one of the byproducts of the exposition now under way in Tulsa is a public-relations accomplishment. The public and the industry itself through visits and through the press and radio reports are obtaining a better understanding of what is required in equipment, materials, and operating technology to supply 10 gal. of gasoline and a quart of oil at the corner station, the 2,000 gal. of winter furnace oil, and the hundreds of other petroleum products.

We have the feeling that a day or two at the oil show by members of the numerous committees investigating the oil industry at Washington in recent months would be more effective than has been much of the testimony presented to them in explaining the oil industry's activities.

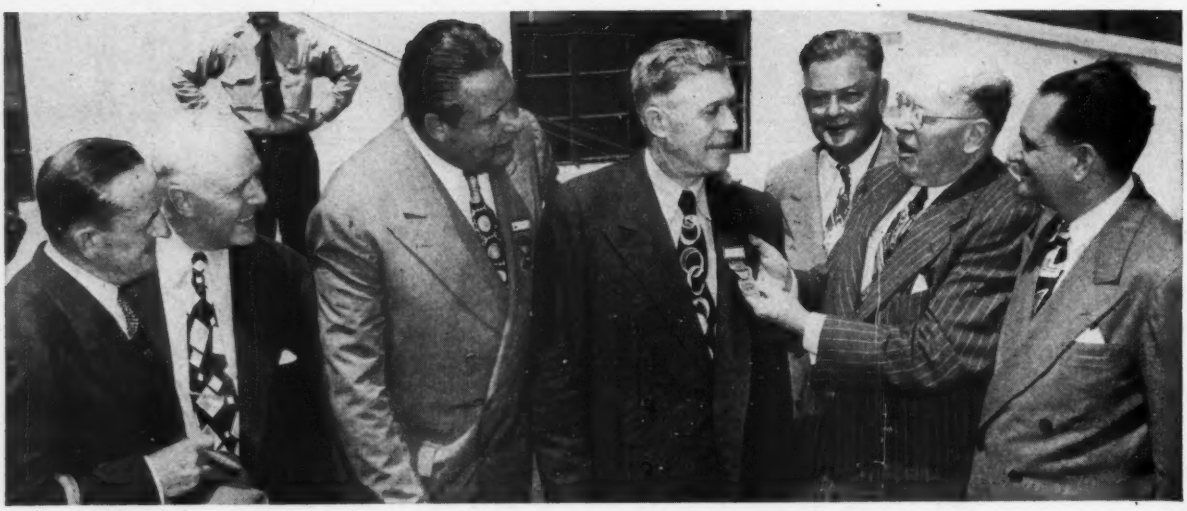
It is true that if they had come they probably would have had to share a bathroom in a private home with an operating executive, superintendent, engineer, tool pusher, or some other key employe also visiting the exposition as part of his operating duty.

This experience of itself might have a salutary effect in convincing committee members that the people who make the wheels of oil turn do not live in multibathroom mansions. Many Journal readers insist that this conception of oil people has been further fostered by articles appearing recently in two magazines of large national circulation which have given an oil background to most of the newly created and largely inflationary wealth of the Southwest.

What the products and services of manufacturers and suppliers mean to this industry is reflected in an editorial-staff report in this issue explaining the expansion so far in 1948 in all divisions of petroleum operations, and the work under way and planned for the remainder of this year and later. Some of the total figures of these programs are staggering.

Then there is another matter involving public policy exemplified by the exposition. This was sensed by Dr. Jose Martorano Battisti, head of Venezuela's petroleum bureau, who pointed out that in parts of the world the new equipment and techniques would be concealed rather than revealed.

Dr. Martorano, who heads the government's end of the second largest oil-producing country, sounded a keynote of the exposition when he said in the opening ceremonies Saturday that "with the pressure and tension which beset the world today, it is a source of genuine hope and encouragement to see assembled men from many countries joined in fraternal and close association, free of suspicion and rancor and hatred; to engage in amicable and harmonious discussion of our common aims and problems, and to study concrete manifestations of the technical and social progress which international good will and cooperation make possible."



Informal shot of I.P.E. officials and guest speakers, taken on the speakers' platform. Seen are William R. Boyd, Jr., president of the American Petroleum Institute; William B. Way, general manager of the I.P.E.; Interior Secretary J. A. Krug; Oklahoma's Gov. Roy J. Turner; W. K. Warren, I.P.E. director and president of Warren Petroleum Corp.; W. G. Skelly, president of I.P.E. and of Skelly Oil Co.; and Jose Martorano B., director of Venezuela's Petroleum Board

Krug Quiets Industry's Fears as Oil Show Unveils Scientific Progress to Entire World

by Henry D. Ralph

THE finest products of engineering skill and ingenuity open to scrutiny for the progress and welfare of all."

This was the description of the Silver Anniversary International Petroleum Exposition given by Dr. Jose Martorano Battisti, director of the Venezuelan Petroleum Bureau, as he participated in the ceremonies opening the 8-day oil show May 15.

The aptness of this description became apparent as the show progressed.

The products of nearly 2,000 manufacturers proved to be indeed the finest of engineering skill and ingenuity, as evidenced by the keen interest shown by hundreds of oil operators from all over the world and the brisk business in placing orders. New tools, new techniques, new adaptations of scientific knowledge were unveiled to meet the pressing need for more petroleum products to power the industries of the world.

And the distin-

Aerial view of the International Petroleum Exposition taken immediately after the opening ceremonies May 15. Hall of Science in the foreground

guished Venezuelan's observation about open scrutiny for mutual progress was no platitude, for here, as nowhere else on earth, competitors bared their accomplishments and the oil men of the world looked, listened, and traded information.

From a score of foreign countries and all over the United States came government officials, supply manufacturers, and petroleum operators to inspect the $100,000,000 worth of equipment and special exhibits.

Sales Were Brisk

Exhibitors, by and large, expressed themselves as well pleased at the number of operating oil men present and the interest they showed. Spot checks indicated that even on Sunday, when the Tulsa public flocked to the show, more than one-third of the men on the grounds were actual or potential customers for petroleum equipment. Exhibitors vied to announce the first sale, but it was a tie; within minutes after the exposition was officially opened it was announced that many important items on display had been sold on the spot and before long "Sold" signs were in evidence throughout the grounds.

The brief opening ceremonies began at 10:00 a.m. Saturday, with P. T. Gilmer, Public Service Co. of Oklahoma, master of ceremonies. Mayor Roy Lundy gave the figurative keys to Tulsa to the exposition and its visitors.

"This is a significant day to the manufacturing, transportation, and agricultural industries of America and the world," W. G. Skelly, president of I.P.E., told the assembled crowd. Recalling the progress made by the oil industry in the 25 years since the first exposition, Skelly said the developments of the last few years, displayed on these grounds, exceed in importance all other methods and machinery created in the history of the oil business.

"It is a source of credit and pride to the oil fraternity that the oil business has kept pace with other major industries and contributed greatly to the economic life of the world," Skelly said.

"This is not just a Tulsa show, not just a state or national show," said Oklahoma's Gov. Roy J. Turner. "It is a world show to assist all countries in increasing their supplies of petroleum."

A similar note was sounded by Clark Hungerford, president of the Frisco Railroad, who in the name of the transportation industry, saluted "the industry which powers the greatest free-enterprise economy in the world and whose spirit of progressiveness is needed now by the entire world."

Dr. Martorano, representing the second largest oil-producing nation of the world, made the significant observation that in some parts of the world technical progress and new developments are kept cloaked in mystery and hidden from view.

The featured address was that of Secretary of the Interior J. A. Krug, who expressed his belief that the oil industry's optimism, backed by its leadership and brains, can solve the tough problems facing it, which he listed as the unprecedented demand which shows every sign of increasing, a downward trend in ratio of productive availability to daily demand, an established trend toward dependence on petroleum for all energy-using machinery, and the possibility of a prolonged steel shortage.

Krug Voices Optimism

Noting with approval that the oil industry appears to have lost most of its fear that the federal Government would control it, the secretary said that the astonishing accomplishments of the industry itself are largely responsible for the fact that it came through the war and last winter's shortage scare without permanent controls.

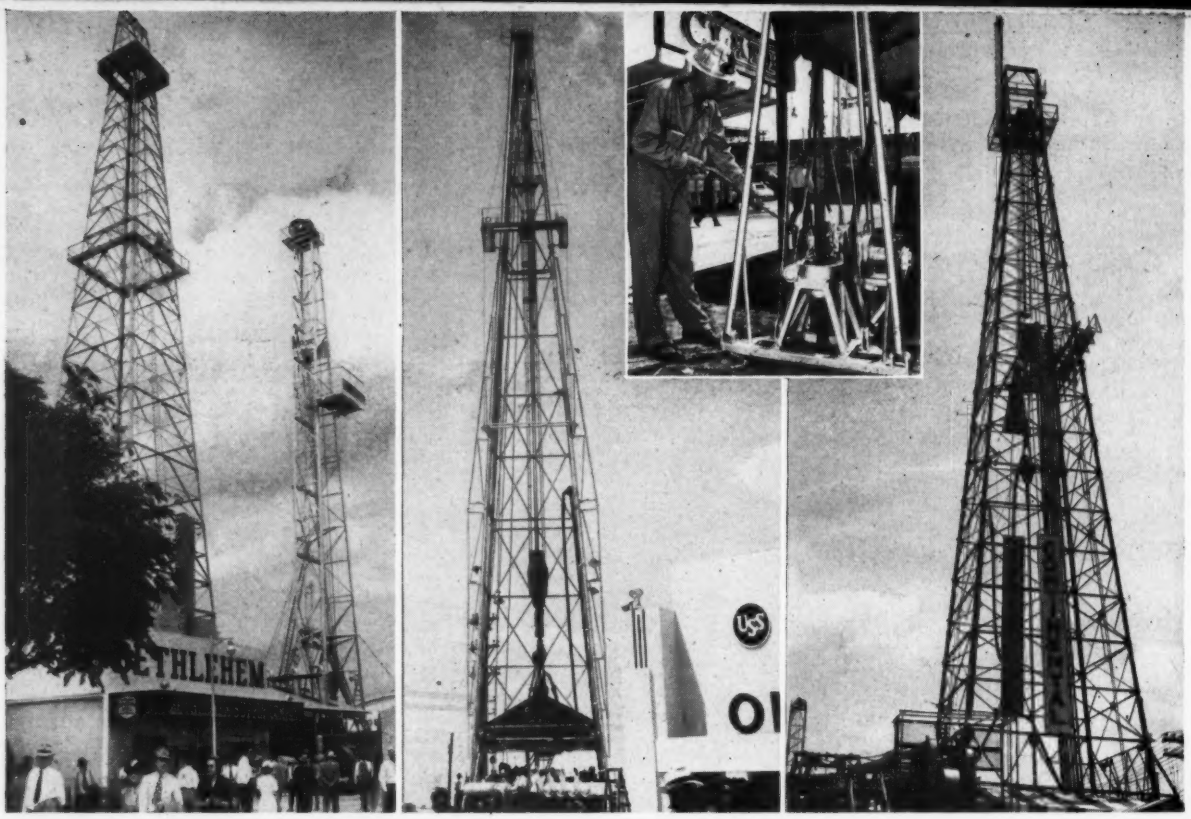
"The accomplishments of the oil industries of the other American countries are comparable to that of the United States," he added. "The inter-American cooperation which resulted in the initial development of South and Central American fields has been attained almost entirely through private enterprise. It is wise, and sound business, now for local capital to become interested in oil development in those areas."

"This exposition," he said, "is not only an evidence of optimism on the part of the oil industry, it is an evidence of the successful application of the daring, ingenuity, and production genius of private industry to the vital problem of running the world's machinery."

The secretary drew loud applause when he declared that the Govern-

(Continued on page 140)

Part of the crowd of early exposition visitors which heard the opening ceremonies. Here W. G. Skelly, I.P.E. president and head of Skelly Oil Co., addresses the crowd from the speakers' platform atop the Nomads' building



The forests of masts, derricks, and drilling rigs on the International Petroleum Exposition grounds range in height from the 14-ft. shot-hole midget (inset above) to a 212-ft. giant (left above). Center picture shows one of the largest portable-type derricks now available: a 128-ft. unit. The group here is representative of the heavy rigs shown at the exposition, equipped with the latest controls dnd new efficient tools for drilling to record depths

Galaxy of Equipment on Dress Parade For Thousands of Exposition Visitors

MANUFACTURERS of drilling equipment at the twenty-fifth International Petroleum Exposition are emphasizing new heavy equipment designed to cope with the many problems occasioned by the current trend towards drilling depths of 20,000 ft. and greater. More efficient drilling also comes in for its share of attention with many items designed to reduce the higher costs which go hand in hand with deep drilling.

From the many exhibits shown the drilling contractor can theoretically put together a rig with the following characteristics: a 212-ft. derrick and substructure rated at 1,200,000 lb.; a draw works designed for drilling depths below 25,000 ft. using 4½-in. drill pipe; controls on the draw works for nine-speed operation; multiple-engine rig drive consisting of six 240-hp. heavy-duty diesel engines yielding a combined horsepower of 1,440; a power slush pump rated at 750 input horsepower with maximum fluid output of 975 g.p.m. and discharge pressures up to 1,800 psi.; 60-in., 12-line traveling block rated at 540 tons; crown block capable of supporting 630 tons; and a 15,000-psi.-test blowout preventer with a working pressure rating of 10,000 psi.

Centralized controls on all principal drilling rigs illustrate the new peak of perfection afforded the driller in reaching new penetration depths.

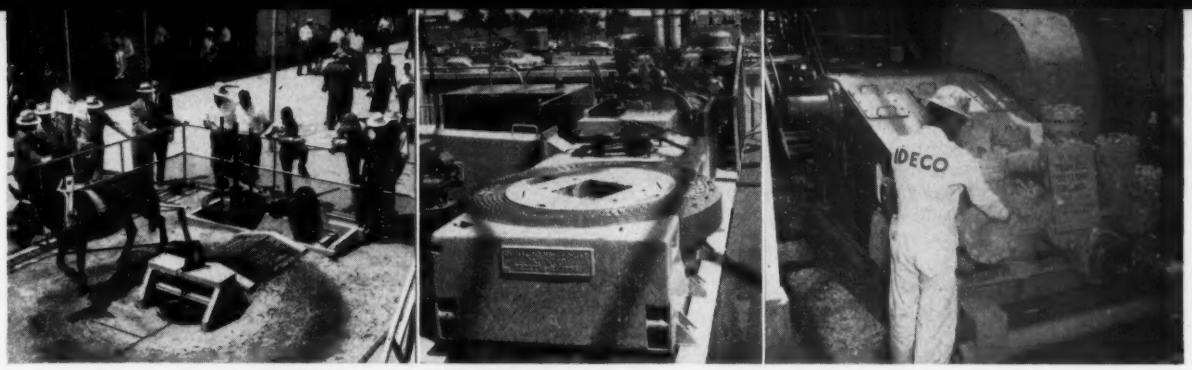
Here are photos and discussions by the Journal's engineering staff of some of the thousands of exhibits in the 4½ miles of display space, walkways, and booths at the 1948 I.P.E. All latest equipment in drilling, producing, refining, natural gas-gasoline, and transportation is on dress parade. Descriptions for each exhibitor were presented in the May 13 issue of The Oil and Gas Journal.

Prominent among the many progressive control designs is a completely automatic bit-weight control which substitutes electrical for mechanical braking. A drag generator maintains a constant hold-back torque on the draw-works drum thereby providing an unvarying hook load and in turn, a constant, desired fraction of string weight on the bit.

A new principle in hoisting is introduced in a light unit capable of well servicing and shallow drilling without the conventional draw works and traveling block. Substituting hydraulics for mechanical power, the new hoist greatly reduces the number of moving parts required in a rig.

An example of improvements in diamond drilling is a new core bit featuring insert units designed to provide longer bit life and reduced maintenance costs. Rock bits of every type reflect the wide choice now available for specialized drilling requirements in all formations at all current depths.

Even drag-type bits show something new. Based on important current



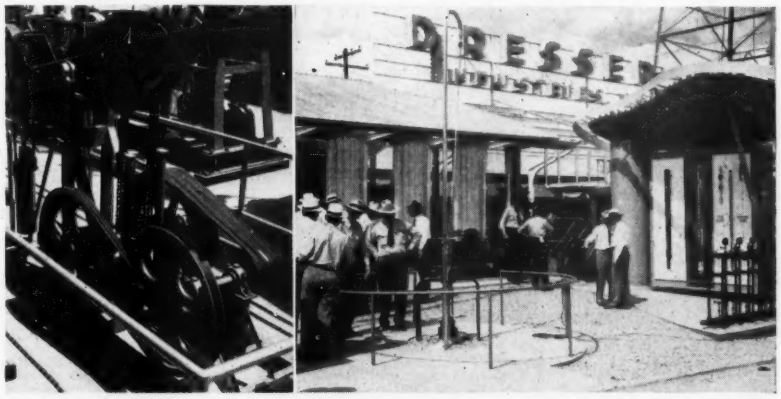
Comic contrast is provided by this one-mule-power "rig" (left above), drilling immediately in front of the tallest rig at the exposition. (Center) One of the newest wrinkles in drilling is this independently driven rotary table powered by two diesels through a torque converter. This slush pump (right) is an all-steel triplex power pump rated for 750 input horsepower and described by its manufacturer as the largest-size power pump ever offered the industry

studies of penetration rates using greater fluid-nozzle velocities, new two and three-way bits are displayed with courses so drilled that the mud stream is directed ahead of the bit to eliminate erosion on the bit face at the higher velocities.

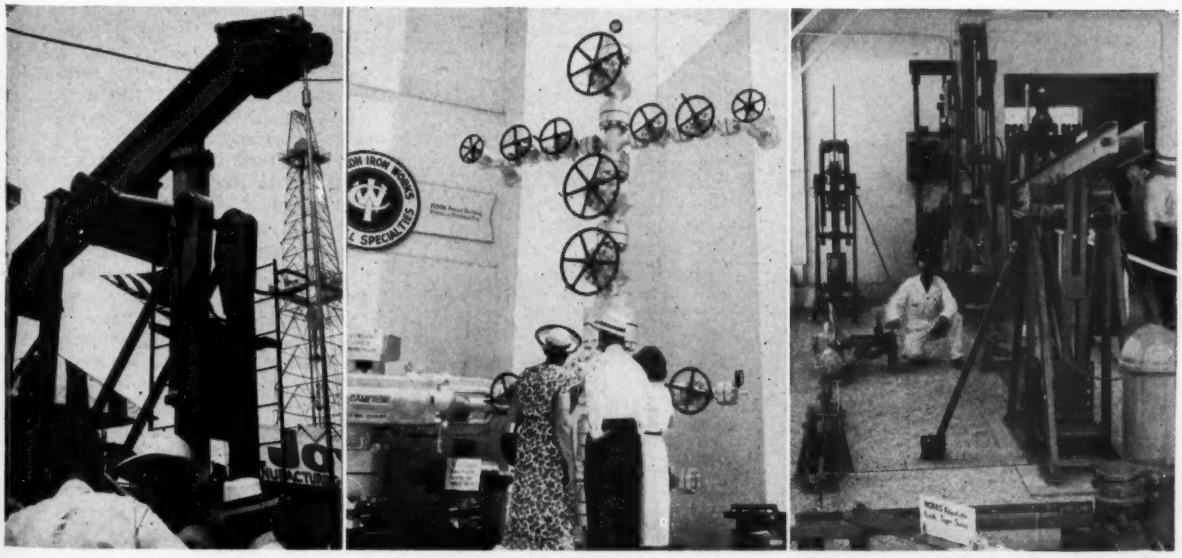
Of interest are the dual-fuel diesel drilling engines which enable the operator to change instantly from oil to gas (and vice versa) while running. The four-cycle diesels are basically designed to operate 100 per cent on fuel oil, but also operate on natural gas with ignition by pilot injection of fuel oil.

Power-operated slips, spinning tongs, tubing tongs, and rod wrenches are very much in evidence at the show. The most recent development among these pieces of equipment is the air-operated spinning tong. This tong is operated by a 9-hp. air motor and will break out or spin up drill pipe and casing in the range of 2⅞ to 7 in.

Inspection methods for the tubular goods used in the drilling of a well



Left: A departure from the conventional pumping jack is represented in a cyclic unit, on which the walking beam is driven by chain belt connecting two eccentric sprockets. Selection of various sprocket ratios results in a constant variation in stroke length from zero to maximum over a desired time cycle; allowing continuous operation on marginal wells, reducing the variation in fluid levels, preventing settling of floating sand and better distributing wear on rod lines. Right: The new "free pump" operated hydraulically, is demonstrated under actual producing conditions. Panel at right is cutaway cross-section, also showing actual operation



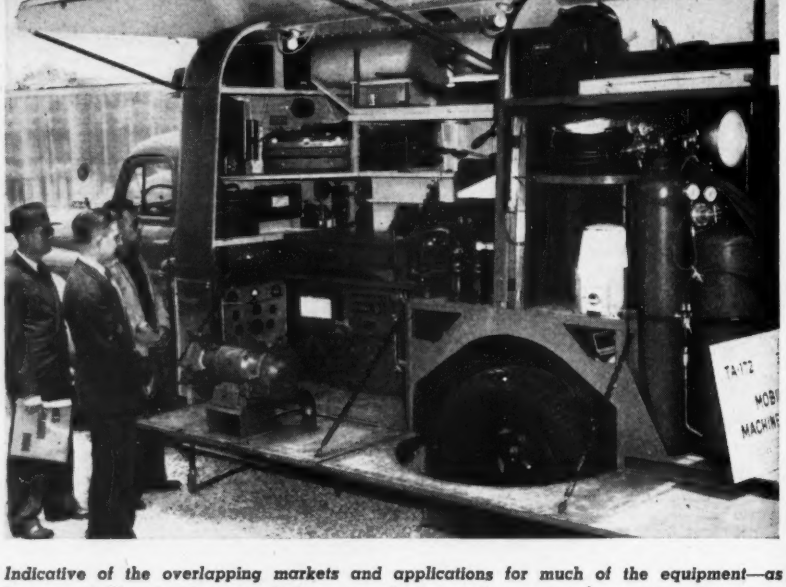
Left: Newly designed individual well pumper featuring pneumatic counterbalance. Center: Twenty-four years of progress in pressure control equipment are represented in the two blowout preventers. The first such preventer ever made boasted a working pressure rating of 1,000 psi.; in comparison is the most recent unit to the left, a 15,000-psi.-test preventer for working pressures up to 10,000 psi. The tree to the right is typical of the many high-pressure well-head connections now in field use. Right: This layout of surface production equipment is actuated by a new compact hydraulic rod-line power unit

come in for their share of attention. One newly developed method on display combines electronic flaw detection with visual tubular inspection for interior surfaces and magnetic particle inspection for tool joints and outside surfaces.

A jet perforation development is exhibited for fishing jobs and well completions. A mixture of 21 chemicals in a metal container is lowered into well on a single electrical conductor. Mixture is detonated electrically and cutting action is due to high velocity or jet action of gases resulting from detonation.

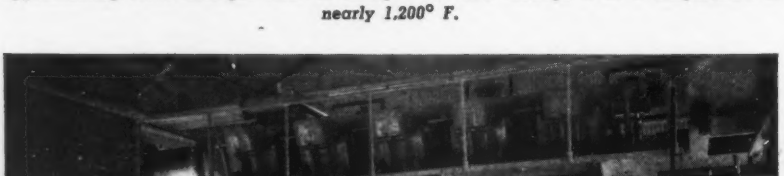
Oil and Gas Producing

Oil-producing equipment in all forms for surface and subsurface applications is on dress parade. Smallest to largest versions of individual pumping units are in actual operation, using various electric-motor and internal-combustion-engine prime movers. Several new hydraulic pumping outfits are creating much interest. There are gas-lift demonstrations, and a new plunger lift is in action wherein the plunger makes periodic travels for the full tubing length.



Indicative of the overlapping markets and applications for much of the equipment—as between drilling, producing, refining, natural gas-gasoline, and transportation divisions—is this mobile machine shop. It finds a big variety of uses in the petroleum industries

One of the biggest valves in the oil industry. Especially built for a new "cat cracker," approximately 2,500 tons per hour of catalyst will flow through it at a temperature of nearly 1,200° F.



A 2,400-hp. angle-type compressor unit on display is the largest engine driven unit in the world. This has 10 cylinders, 18 by 20 in., and operates at 250 r.p.m. The compactness of the unit is indicated by the fact that it takes up no more space than a 1,600-hp. unit. Low operating cost is the result of low speed and low fuel consumption. Units of this type have recently been installed on a major natural-gas transmission line

A continuous surface-recording bottom-hole-pressure indicator can record the results of drill-stem tests or reservoir pressure information for producing wells. Also on the electric side is a working model of a battery of four stock tanks. This tank battery is completely automatic in filling one tank, then shifting into the next until all are filled. Limit switch valves isolate each tank after it is run to pipe line. A time-controlled gas-lift installation is demonstrated as the producing equipment which serves the automatic tank battery.

Bottom-hole sampling and pressure bombs are on exhibit along with many kinds of equipment ranging from compressors and pumps for pressure maintenance and secondary-recovery work. A new polyethylene transparent plastic envelope affords quick and efficient atmospheric sealing of core samples.

Oil-well pumps of all latest types are exhibited, many in actual operation. Paraffin scrapers, emulsion treaters, oil and gas separators, and production equipment of every description fill booth after booth and much of the outdoor space. Logging, acidizing, cementing trucks, and other field service equipment is displayed and explained by technical representatives.

Refining and Natural-Gas Processing

Process control and regulating-equipment displays at the exposition feature a wide variety of working models. Many of these items are being exhibited publicly for the first time. Some of the equipment is so new that hand-made pilot rather than

production-designed models are being shown.

A number of the exhibitors in the control and regulation field are displaying unitized assemblies available for a wide range of applications. Some of these units provide multifunction performance, to control a set of several different processing variables.

Another instrument of new design is a manometer-type flow controller which is said to be extremely accurate in performance and very simple in design. The instrument on exhibit is a full-scale pilot model, the forerunner of its production-line counterpart which will not be available to industry generally until early next year.

A new departure in instrumentation is a viscosity controller for blending and other operations. A similar device is a liquid gravitometer which is designed for application in fuel blending. Both of these instruments are of the recording type.

Advances in electronics make it practicable to utilize carrier current for telemetering and other types of recording and control for long distances. Recently a method of getting readings from distant meters and gages has been perfected by which a connection is made through arrangements with the telephone company. To get a reading, one calls the meter by local telephone dialing or by long distance and the meter transmits a signal which indicates the reading by code. For instance, a 30-second signal could indicate 30 psi. Radio is mentioned as possible for such operations in the future.

Processing and Equipment

Several processes are on exhibit. Illustrated either in standard or large-scale diagrams or scale models of a plant or in combination of plant layout models and diagrams, the processes on display include latest designs and methods. The pipe fittings, valves, and specialties manufacturers are well represented as are the suppliers of metallurgical construction materials. A display of actual full-scale and cutaway models of a new device for fractionation applications is seen to be of common interest to both natural-gasoline-extraction plant and refinery designers and operators.

Metallurgical construction materials on display in various forms run from aluminum through copper-base alloys, nickel and its alloys, stainless steels, and numerous carbon-steel alloys. These displays offer a wide variety of materials in any number of forms such as tubing lined inside or outside with different materials, pipe, exchanger-tube sheets, and other types of commercial shapes. One exhibitor displays the use of its material in corrosion-resisting service as recommended to the industry, in a large flow diagram from producing well through to final refined product.

Crowd looking at upper and lower sections of a new centrifugal compressor. These types of units among other immediate installations will provide first-stage compression (24 million cubic feet per day) for the oxygen supply to the synthesis reactor at the new Carthage, Tex., Hydrocol plant, and in other process and oxygen sections there. Internally water cooled. Prime mover: steam turbine

Pipe-Line Equipment

The new submerged arc-welding process demonstrated at the exposition will be introduced in the field for pipe-line construction early next year. While this process is electrical, there is no conspicuous electric-arc flash. Weld metal in the form of a wire is fed to the pipe surface through a funnel through which granular flux material flows simultaneously, so the welding is done under a blanket of flux.

Large-diameter pipe is lined up by an electric internal clamp.

For making saddle, bell, and miter cuts and for beveling work a new type of electrically or manually operated fabricating machine is demonstrated which functions by having the cuts controlled by cam and movable sector arm. A tapping machine with a telescoping body is easily handled in the field for pipe up to 6 in. in diameter.

A recently developed hammer-type pipe-cleaning machine is now capable of getting results which have heretofore been accomplished by shot blasting. An improved modern type of thermostatically controlled dope kettle is equipped with a boat-type propeller which replaces a former auger-type agitator.

Ballasting of pipe at river crossings by a concrete coating is effected for pipe which has been protected with an extruded mastic coating.

Scarring of pipe is avoided by rubber treads on cleaning machines and dope cradles. A tapping machine with telescopic body is easily handled in the field.

Mechanical principles demonstrated in displacement meters are being applied to equipment developed for hydraulic drive to supplant gears and even for new types of petroleum pumps for L.P.G. and pipe-line service. Casing bushings and insulators are installed at road crossings.

Ditching for the 36-in. diameter lines will be done by a new heavy-duty ditcher capable of digging a ditch 51 in. wide and 8 ft. 8 in. deep. Four smaller sizes of ditchers are being supplanted by a new type of ditcher with a wide range of capacity.

Largest sizes of trucks capable of carrying up to 65,000 lb., gross vehicle weight are displayed. One truck with a 286-in. wheelbase driven by a two-cycle diesel engine with gross capacity of 55,000 lb. can tractor or tow 90,000 lb.

Difficulties due to pulsating flow of reciprocating pump operation is eliminated by a six-cylinder pump direct connected to a dual-fuel engine operating at 400 r.p.m. This pump is capable of operating at 2,500 r.p.m.

Semiportable skid-mounted compressor units adaptable for operation between the field and pipe-line compressor station are shown.

Where centrifugal compressor equipment is exhibited, manufacturers' representatives report that development work on gas turbines is being carried on by their companies which promises to lead to the building of gas turbine driven centrifugal compressor units in the future for natural-gas transmission.

A compressor unit is shown which has been built for the purpose of unloading L.P.G. from tank cars. Various new tools operated by compressed air are displayed including an impact drill, impact wrenches, jack hammers and an air operated electric generator.

Revised Synthetics Bill Reaches House With Favorable Report

WASHINGTON.—A revised synthetic-fuel promotion bill was sent to the floor of the House last week by the interstate commerce committee, with a favorable report declaring that development of a synthetics industry should be expedited in the light of our present and prospective petroleum-supply situation, preferably by private interests but, if necessary, by the Government.

The approved bill was a complete rewriting of the measure introduced by Committee Chairman Charles A. Wolverton of New Jersey on February 19, based on testimony in public hearings and the reactions of various interests whose views were later solicited.

The original bill called for the construction of at least three plants with a capacity not less than 10,000 bbl. daily of liquid fuels from, respectively, hydrogenation of coal, coal synthesis, and oil shale, with the Reconstruction Finance Corporation to build them if, within 120 days, private interests failed to come forward with proposals. The RFC would be given an appropriation of $400,000,000 to carry out the purposes of the measure.

5,000-Bbl. Minimum

The new bill calls for plants of not less than 5,000 bbl. daily, and the RFC would be authorized to make loans for periods as long as 30 years to private interests which would construct them, and could subsidize their operating by buying the synthetic products with the expectation of reselling them at a loss or by making payments or commitments for payments, over a period of not exceeding 30 years.

Provision is made for setting up industry advisory committees including representatives of the oil, coal, and other affected industries and whenever, after consultation with the appropriate committee, the Secretary of the Interior determines that financial assistance to private industry is necessary to promote research and development of methods and processes, he may instruct the RFC to enter into contracts or other arrangements with designated persons for such projects, including the construction and operation of pilot and demonstration plants.

The secretary also is to review the progress of the industry annually and, if private industry fails to construct and operate the number and types of plants he deems necessary, may instruct the RFC to build one or more plants with a designed capacity not exceeding 30,000 bbl. daily in the aggregate. The plants would be constructed under contract by private industry.

The bill would authorize the Secretary of the Interior to create and set aside such reservations of oil shale and coal on public lands as may be necessary to insure the effective operation of any commercial-sized synthetic fuel plant. He also could lease any of the oil shale and coal on the public lands without regard to restrictions or limitations of the Mineral Leasing Act of 1920, and could lease, for use in the construction and operation of synthetics plants an area not in excess of 320 acres of public lands.

The RFC would be given authority to have as much as $350,000,000 outstanding at any time in the shape of loans, commitments and construction contracts, and the Interior Department would be given $1,000,000 to administer the act.

Senate Committee Kills Bill to Amend Gas Act

WASHINGTON.—The Senate interstate commerce committee did the expected May 13, killing the Rizley-Moore bill for revision of the Natural Gas Act by a vote of 9 to 4.

At the same time, a subcommittee composed of Senators Homer E. Capehart of Indiana, chairman; Albert W. Hawkes of New Jersey, and Brien McMahon of Connecticut, was appointed to consider President Truman's nomination of Thomas C. Buchanan to be a member of the Federal Power Commission. The subcommittee is to make its report not later than May 27.

Indications that political considerations threatened Senate approval of the bill, previously passed by the House, have been piling up for some weeks and some members of the natural-gas industry were hopeful that the measure would be laid aside until next year. However, they wanted this done by agreement and not by a vote which killed the bill.

Three of the Republican and all six of the Democratic members of the committee voted against sending the measure to the floor, the only votes for it being those of Senators E. H. Moore of Oklahoma, coauthor; Wallace H. White, Jr., of Maine, chairman of the committee; Hawkes, and Capehart.

Operating Rotary Rigs Reach New Record High

WITH 2,208 rotaries "turning right," the number of active rotary drilling rigs in the United States reached a new all-time high on May 1, surpassing both war and peacetime records. On a numerical basis, there were 557 more rigs running than on May 1, last year; 335 more than in November 1944, when the wartime peak was reached, and 248 more than on the same date last month. On a percentage basis the figure, released by the Interstate Oil Compact Commission, is 33⅓ per cent above the same date last year, 18 per cent over the wartime peak of 1,873, and 13 per cent higher than last month's total. (See chart, opposite page.)

The Rocky Mountain area, Oklahoma, the Illinois area, and Kansas (in the order named) have shown the most spectacular increases in drilling activity over the past year. There are 113 per cent more rigs running in the Rockies, 73 per cent in Oklahoma, 48 per cent in the Illinois area, and 39 per cent in Kansas. Oklahoma and the Rocky Mountain area (which includes western Canada) were also among the top four in the actual number of increased active rigs as compared with last year. Oklahoma had 132 more rotaries running and the Rockies increased by 103. Other leaders were the West Texas-New Mexico area with 153 and the Gulf Coast with 50.

Comparison by areas is as follows:

Area—	Rigs running May 1, 1948	Per cent increase over May 1, 1947	Per cent increase over April 1, 1948
Pacific Coast	179	26	12
Oklahoma	312	73	25
Kansas	146	39	33
Rcky. Mtn. (incl. W. Canada)	194	113	9
N. La., E. Tex., Ark.	153	2	6
W. Tex., N. Mex.	557	38	5
Gulf Coast	550	10	5
Illinois	117	48	83
	2,208	34	12

The significance of current drilling activity is all the more apparent when compared with 1941, the last prewar year. At that time the active rotary-rig figure ranged from 900 to 1,200 per month and averaged around 1,100. Thus far this year the average monthly figure is 2,010.

The unprecedented and sharp rise in active rotaries ties in closely with well completions and drilling-footage figures. (For details see page 147.) The curves on completions and footage have shown a very sharp rise this year, starting the last week in March. This rise—which is to be expected with warm weather—has been much sharper and started earlier than last year.

_____this week

EXPOSITION—Oil men from throughout world gather at International Petroleum Exposition grounds in Tulsa. . . . Exhibits spread over 15 acres show latest in oil equipment and processes. . . . Date for next exposition left undecided pending complete poll of exhibitors. . . . Attendance heavy and equipment sales brisk during opening days. . . .

INTERNATIONAL—Russian-controlled Romanian Government appoints a state administrator for Steaua Romana (British), Ltd. . . . It is believed to be the first step toward dissolution of another oil company in Romania. . . . ¶Shell Oil Co. of Australia, Ltd., places bitumen refinery at Clyde, New South Wales, on stream. . . . ¶Oil reserves of Venezuela "will be at the full disposal of those who fight for freedom and democracy," Juan P. Perez Alfonso, minister of fomento, says. . . . ¶Austrian Government Commission predicts Zisterdorf oil fields will be ruined within 2 years by Soviet policy of overproduction and removal of vital equipment. . . . ¶Granting of a lease to Anglo-Egyptian Oilfields, Ltd., by Egyptian Congress is expected soon. . . . Socony-Vacuum Oil Co., Inc., receives the millionth barrel of crude from the Persian Gulf. . . .

INDUSTRY—Operating rotary rigs reach new all-time high with announcement that 2,208 rigs were running on May 1. . . . Figure is 557 greater than same date a year ago and 335 more than wartime peak in 1944. . . . ¶Right of Reynosa Pipe Line Co. to export natural gas to Mexico via pipe line from Hidalgo County, Texas, is upheld by federal Circuit Court in New Orleans. . . . ¶Alberta Government assumes jurisdiction over wild well in Leduc field. . . . Entire Leduc field shut down as Nisku pipe line is devoted entirely to carrying off oil from diked area around wild well, making an estimated 10,000 bbl. daily. . . .

GOVERNMENT—Revised synthetic-fuels bill reaches floor of House with favorable report from interstate commerce committee. . . . Bill calls for construction of plants with minimum capacity of 5,000 bbl. daily by private industry with RFC loans. . . . RFC subsidies also to be permitted. . . . ¶Senate committee kills by 9 to 4 vote bill to amend Natural Gas Act. . . . ¶Bill to return tidelands to states given further blow in Senate as utilities' representatives move to amend measure to achieve "clarification." . . .

TRENDS—Runs to stills reach second highest mark in history with an average of 5,602,000 bbl. daily during week ended May 8. . . . Highest was 5,637,000-bbl. average set during week ended January 3. . . . Gulf Coast area records new high runs with daily average of 1,457,000 bbl. daily. . . . ¶Stocks of gasoline on May 8 showed drop of 2,319,000 bbl. from previous week but gain of 9,720,000 bbl. from same period a year ago. . . . Other stock figures show kerosine up 178,000 bbl. from previous week and 3,280,000 bbl. above a year ago; distillate down 107,000 bbl. from previous week but 3,588,000 bbl. over a year ago; and residual, 1,039,000 bbl. up from previous week and 9,192,000 bbl. up from a year ago. . . . Total finished stocks on May 8 total 25,780,000 bbl. higher than same time in 1947. . . . ¶Crude stocks, however, are at level 14,800,000 bbl. below 1947 figure. . . . ¶Well completions total 783 during week ended May 15. . . . Highest this year and two higher than the highest figure in 1947. . . . Wildcat completions unchanged at 125. . . .

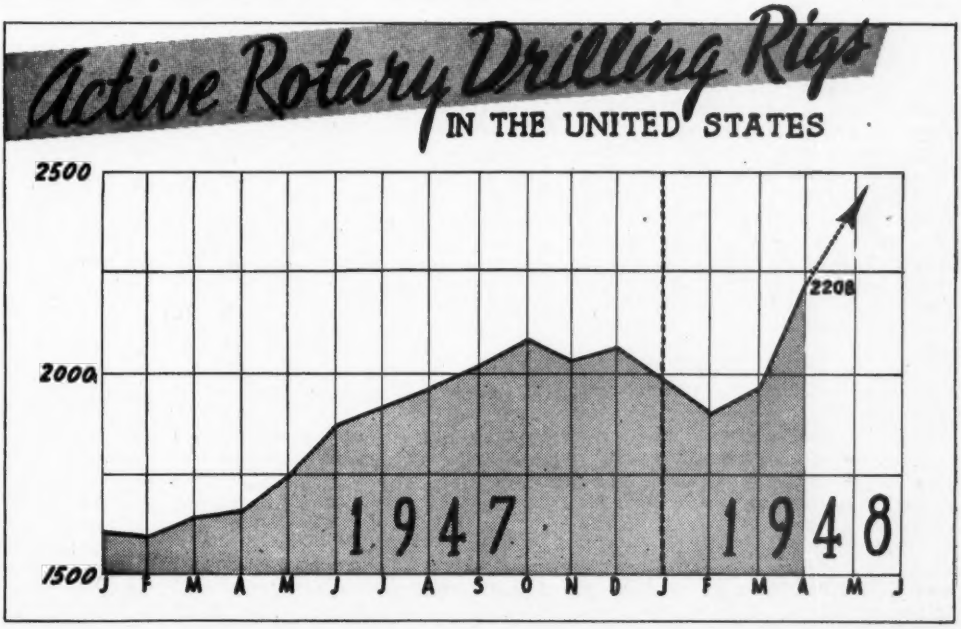


Chart showing trend established by increasing number of active rotary rigs in United States in 1948, as compared with 1947. The sharp rise ties in closely with well completions and drilling footage figures. For the first 17 weeks of this year, to April 24, well completions, including both wildcats and field wells, were averaging 630 per week. For details on rotary-rig operations, see story on opposite page

New Fuel Systems Needed to Allow Greater Butane Use, Refiners Told

by Arch L. Foster

PHILADELPHIA.—Shortages now plaguing the industry could be greatly relieved if automotive and other industries would provide equipment to use portions of crude oil and natural gasoline which cannot now be utilized, refiners attending the meeting of the Division of Refining of the American Petroleum Institute here May 10-13 were told.

Fuel systems which will handle much more butane and light products, thereby utilizing heavier gasoline products and permitting considerably increased yields, are needed immediately, the refiners were told.

One great source of additional motor fuel, from a raw material which cannot be employed to raise the yield of distillate heating oil, is butane, of which immense quantities are available, it was pointed out.

Would Conserve Crude

R. C. Alden and T. W. Legatski, of the research department of Phillips Petroleum Co., said the improvement of automotive fuel systems so that gasoline of only 1 lb. higher Reid vapor pressure might have been used satisfactorily would have permitted refiners to add nearly 10,000,000 bbl. more of butane in 1946, equivalent to nearly 22,000,000 bbl. of crude processed.

Failure to take this "relatively small step required 12½ days' extra crude supply and refinery operation that year," they said. "It is interesting to speculate," they continued, "on what could have been done about the burner-oil shortages with 12½ extra days of refinery operation."

The automotive and petroleum industries have a large and growing butane problem, and all solutions other than motor-fuel blending evade the issue, they said. If all butane now available could be blended into motor fuel, they asserted, the resulting increase would be about 13 per cent of present production; the average vapor pressure would be about 20 lb., and increased gasoline production would equal that from 600,000 bbl. of additional crude per day at current yields.

Much less is known about evaporation losses from the fuel system of a car than about losses from the refinery to the car, T. L. Apjohn and D. P. Heath, supervisor and senior engineer, respectively, of the research and development department of Socony-Vacuum Oil Co., Inc., said.

Their analysis revealed that when all evaporation losses are included higher energy recoveries can be obtained by converting butanes to gasoline by chemical means than by blending. If only the losses sustained from manufacture to sale to the user are considered, then better returns are obtained by blending the raw butanes directly.

Over-all losses of gasoline by volume per cent of the total, from the refinery through the carburetor, are shown in the accompanying table, prepared by the authors.

Season	Vapor pressure	Loss, per cent total gasoline
Summer	8	2.04
Summer	10	3.99
Intermediate	10	2.21
Intermediate	12	3.80
Winter	12	1.03
Winter	14	2.18

Apjohn and Heath estimated that the evaporation losses after the fuel is received at the service station equal those experienced from the time of manufacture until the fuel reaches the station, but concluded that the "case for butane utilization in gasoline is strong in the intermediate and winter seasons."

Redesign a "Must"

Redesign of automotive engines to increase the "tolerance" of their fuel systems for more highly volatile fuels is one of the most important "musts," said L. L. Davis, Continental Oil Co., in discussing front-end volatility and processing for high-octane fuels.

Raising octane ratings by processing such as catalytic cracking or deeper thermal reforming decreases the gasoline yield about 1 per cent for each octane number improvement, Davis said. Simultaneously, butane production increases rapidly with octane number increase, and current engines will not permit use of appreciably greater amounts of butane or natural gasoline, further reducing both octane ratings and motor fuel yields.

An increase in summer vapor-pressure tolerance from 8 lb. to 12 lb., Davis said, will increase our total gasoline production by 10 to 11 per cent, more than offsetting the volume loss sustained when improving the octane number by 10 points. Thus gasoline volume loss caused by increasing octane ratings can be offset largely by raising the vapor pressure of the fuel and the volatility tolerance of the fuel systems. This, at the same time, utilizes most or all of the excess light products made by raising octane ratings.

Thermal reforming is the primary octane control, and its greater use means more butane-butene fraction. Davis showed that with 50 per cent catalytic cracking, corresponding thermal cracking, and thermal reforming to the point of diminishing returns a maximum of 84-85 octane number (Research) can be obtained with losses, from maximum production, of 9 per cent for 8-lb. motor fuel, and 6 per cent for 10-lb. gasoline. Car engines which require an 8-lb. vapor pressure fuel of 86.5 octane number will cause a loss of up to 18 per cent over engines which can operate on 12-lb. fuels of 79.5 octane number, an extremely high yield loss.

Gains in Gasoline Yield

Analogously, the higher octane rating of catalytically cracked fuel in its upper distillation range, 50-90 per cent evaporated range, permits the refiner to cut deeper into the cracked distillate and to increase the total gasoline yield greatly, J. B. Hill and W. C. Huffman, Sun Oil Co., stated. Gasoline yield may be increased by 18,000,000 bbl. per year by cutting the catalytic gasoline stream 90 per cent point at 430° F. instead of at 370° F. as is now customary, they said. Cooperation of the automotive industry in designing its fuel system to handle properly the motor fuel of heavier end point made in this manner was urged by the authors in order to stop this economic waste and boost importantly our total of available gasoline.

Present catalytic cracking capacity for the United States is about 1,200,000 bbl. per day, and the gasoline so made comprises about 22 per cent of our total gasoline production. Contrary to thermally cracked gasoline, the octane rating of the product drops off very slowly with rise in boiling point, and it is not necessary to undercut to keep the octane level at a proper value. This boosting of the tail-end boiling point may involve problems with conventional engines since they are not now designed to perform properly with this type of fuel.

Recalculating yields and qualities as shown in W. M. Holaday's January 1948 S.A.E. paper, based on a 100,000-bbl. per day crude charge, the authors showed that the yield of gasoline obtained by boosting the 90 per cent point from 380° F., Holaday's assumption, to 430° F., totals 2.6 per cent more for the latter case. Applying this to the entire catalytic capacity mentioned above with a 42 per cent catalytic gasoline yield, this increase raises the catalytically cracked gasoline from 504,000 bbl. per day to 577,000 bbl. per day. Keeping octane

rating constant, over-all yield increase will be 50,000 bbl. per day, the equivalent of saving 115,000 bbl. of crude daily.

Utilizing fuels of lower tail-end volatility is a problem for the car maker, the authors said.

Corrosion Discussed

Wherever the neutralization or removal of corrosive agents from materials in refinery operation is not feasible, the use of alloys to combat and minimize corrosion will continue to be economically attractive, M. A. Furth, technical foreman of the Smith's Bluff, Tex., refinery of Pure Oil Co., said in discussing Pure's experiences in solving corrosion problems on the Texas Gulf Coast. In the interest of keeping material costs in line with other conditions, the development of new alloys to meet specific conditions must continue, he said.

In high-temperature sulfur corrosion, such as is found in cracked distillates at temperatures of 675° F. and higher, carbon steel is removed at rates as high as 0.15-in. per year. Use of 5 per cent chrome alloy (so-called 4-6 chrome) has reduced this rate to a maximum of 0.008 in. per year. Where hydrogen sulfide is present, or where hydrogen chloride is released from stocks high in salt content—up to 125 lb. per 1,000 bbl.—corrosion of carbon steel may run as high as 1.5 in. per year, but can be reduced to small values by ammonia injection. Caustic injection is better to neutralize these acidic components, especially where acid water is located, care must be used to avoid caustic attack on nonferrous materials in the units.

Duce Addresses Group

Our consumption of oil will continue to increase and our own resources should be preserved for use at home, foreign oil should be imported when needed to maintain the American standard of oil consumption, dependent on reasonable prices, James Terry Duce of Arabian American Oil Co. told the refiners.

Our present shipment of 600,000 bbl. per day of petroleum products outside the Americas will tend to be consumed in the Western Hemisphere, Duce said, and supplies for Europe, Asia, and Africa should be met by foreign oil produced by American companies. If American companies do not produce it, foreign companies will do so, Duce said. Foreign companies producing foreign oil do not pay United States income taxes, he continued, and our American corporations and the U. S. Government will be the poorer if we do not bring in a good part of this foreign oil.

The 30 billion barrels of oil reserves in the East are a safeguard against shortages and related political frictions, but the short-term outlook is complicated by shortages of steel, tankers, and other transportation.

Speaking at the annual dinner which closed the meeting, Dr. Robert E. Wilson, chairman of the board of Standard Oil Co. (Ind.), said expected accomplishments in the refining division this year should prove "an amazing achievement in view of the shortages of steel and other materials which have held back our expansion program."

Wilson said crude runs should be 7 or 8 per cent higher this year than last, or an increase of 17 per cent above the wartime peak and 44 per cent above the prewar peak in 1941.

The stepped-up runs, he said, will provide about a 5 per cent increase in petroleum supplies available for domestic consumption. This, he said, will be sufficient to satisfy probable demand only "if new oil-burner installations return to the relatively low prewar rate, and if consumers continue to cooperate in conservation of both gasoline and oil, and if we have a moderate winter, and if there are no serious strikes in our or other basic industries."

Government Assumes Control of Wild Leduc Well; Entire Field Shut Down

CHATHAM, Ont.—The Alberta Petroleum and Conservation Board last week assumed supervision over Atlantic Oil Co.'s Well No. 3, which blew out of control March 8 and which forced a complete shutdown of operations in Leduc field May 12.

V. J. Moroney, operations manager in the producing department of Imperial Oil, Ltd., Calgary, was named superintendent in charge of operations aimed at controlling the wild well.

The well first came into production March 8 and blew wild for more than 36 hours. It was brought under temporary control when control equipment was connected to the 300 ft. of surface casing, but gas, followed by oil, broke out around the casing, spurting through fissures in a large area surrounding the well.

Flow of oil originally was estimated at 3,000 bbl. daily, increasing to an estimated 10,000 bbl. Gas flow was estimated at 50,000,000 to 75,000,000 cu. ft. daily.

Late last week Myron Kinley, wild-well expert from Texas, headed a crew which would attempt to install additional blowout and control equipment. Plans were to install two 7-in. flow lines, which would be opened wide in an attempt to relieve pressure and halt the flow through fissures around the well.

The Alberta petroleum board ordered Leduc's 60 wells shut down so that the Imperial pipe line could be used entirely to carry oil from the lake formed by dikes around the wild well. Officials expected to move 12,000 bbl. daily via pipe line to Nisku, and by rail from there to refineries.

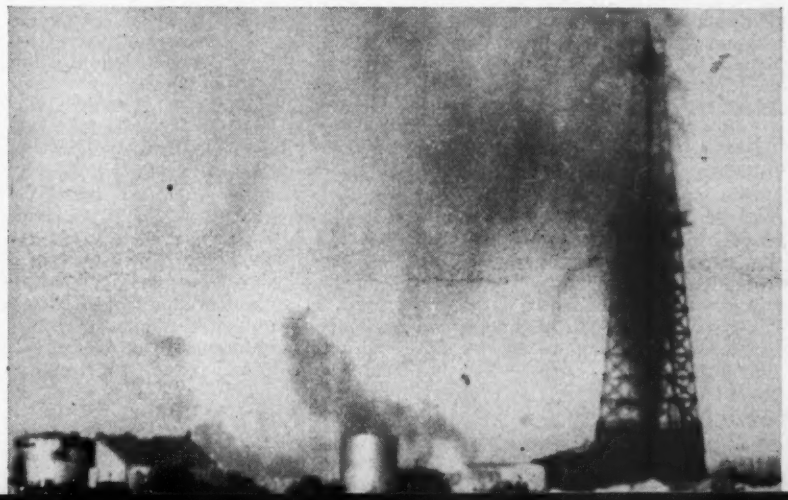
Tentative plans called for the drilling of two relief wells, when surface conditions permit, to tap the same reservoir so that the wild well might be killed.

Partial production of other wells in the field is expected to be authorized as soon as oil in the surface storage is drawn off and the fire hazard removed.

All operating companies in Leduc field, including Imperial, Home Oil Co., Atlantic, and General Petroleum Corp., were cooperating in measures designed to protect the field.

The order issued by the petroleum and conservation board shutting in all Leduc wells was expected to continue in force for about 3 weeks, and possibly longer.

Atlantic's Well No. 3 in Leduc field 20 miles southwest of Edmonton, Alta., as it appeared March 8 before being brought under control. Gas production was estimated initially at 75,000,000 cu. ft. daily



International

WORLD-WIDE OIL DEVELOPMENTS

New Romanian Move Is Seen as Attempt to Dissolve Oil Company

THE Russian-Controlled Romanian Government is believed to have taken the first step toward dissolving still another Romanian oil company which is owned by outside interests.

A state administrator has just been named for Steaua Romana (British), Ltd. The appointment of such an official late last year was the first move made by the communist government in forcing the Royal Dutch-Shell subsidiary, Astra Romana Societe Anonyme, to dissolve. At the time of the dissolution last March, Astra Romana issued this statement:

"As a result of the many acts of interference by the supervisory administrator, it was necessary to dissolve the company."

Act of Bad Faith

Oil men in New York asserted the appointment of a state administrator for Steaua Romana, which occurred only a few days before the Soviet Union indicated its willingness to discuss, with the United States, a halt to the "cold war," can be interpreted only as another act of bad faith on the part of a Soviet-directed satelite, even though the company involved is owned by British, rather than United States interests.

According to Rador, the Romanian news agency, the Steaua Romana appointment was taken "because the company artificially inflated production costs of crude oil and of oil products and harmed the national economy."

Actually, well-informed sources state, the Romanian Government is still insisting that the foreign companies pay higher wages and furnish food and other necessities to employs at certain minimum costs. At the same time, the government has forbidden the companies to raise the cost of their products, or has so delayed payments as to financially embarrass corporations owned by outside interests.

Steaua Romana owns oil properties, refineries, and pipe lines and has production in all of Romania's important oil fields.

Shell Bitumen Refinery Is Placed in Operation

Shell Oil Co. of Australia, Ltd., went on stream early this month with its bitumen refinery at Clyde, New South Wales. The plant is designed to handle 35,000 tons annually, or approximately 700 bbl. daily. This is an addition to Shell's Clyde refinery which processes about 6,000 bbl. daily of British Borneo crude oil.

E. N. Avery, general manager, and D. A. Fell, superintendent of the Shell plant, presided at opening ceremonies attended by the governor of New South Wales.

Socony-Vacuum Moving Oil Through New Line

Socony-Vacuum Oil Co. of Colombia is now pumping 750 bbl. daily of crude oil through its newly constructed 4-in. pipe line which runs from the Cantagallo Concession across the Magdalena River and connects with Andian National Corp.'s 10-in. line.

The Andian line, a common carrier, extends inland about 335 miles, paralleling the Magdalena River from Mamonal terminal on Cartagena Bay to Tropical Oil Co.'s oil fields at El Centro. Socony-Vacuum's line connects with a loop at Puero Wilches.

To lay Socony-Vacuum's line across the river, which is 5,380 ft. wide at the crossing, five sections of 145 ft. each were welded. Oil-well drill pipe, which had been used, was utilized for this line. Company officials report that the river crossing was a difficult engineering task as there is no room on either side for tractors.

Socony-Vacuum is producing approximately 1,000 bbl. daily from its 62,000 acre Cantagallo Concession, which was obtained December 16, 1939. Eleven wells have been drilled there to date. The concession is 280 miles from the Caribbean coast. Wells are producing from sands 6,000 to 7,000 ft. deep.

5 Qatar Is Brought In As Good Producer

Petroleum Development (Qatar), Ltd., an affiliate of Iraq Petroleum Co., Ltd., has brought in 5 Qatar as an oil producer in that country's Dukhan field. It was drilled to 5,807 ft.

As this well is on the same structure as 4 Qatar, which had a daily potential of 9,000 bbl., it is expected that the latest completion will be equally productive. This is the second well to be completed since drilling was resumed following the war.

Three rotary rigs, one American and two British, are now in Qatar. Two are operating and the third is rigging up.

I.P.C.'s board of directors still plans to construct a 60-mile, 12-in. pipe line from Dukhan across the Qatar Peninsula to Jebel Waqrah. Meanwhile, an oil-surfaced road 52 miles in length is being built. *(For other details on Qatar see The Oil and Gas Journal, June 28, 1947, page 80, and April 15, 1948, page 58).*

British Halt Conversion of Coal Burners to Oil

Great Britain's coal-to-oil conversion program has come to a virtual halt because of the increased consumption of petroleum products in the United States and the general increased demand for oil throughout the world.

Conservative members of the British Parliament last week questioned the minister of fuel as to whether there would be sufficient supplies of fuel oil for the large industrial concerns which have already converted, largely on the government's request. The prolonged shut-down of Haifa's 90,000-bbl. daily refinery will aggravate the current fuel-oil supply situation in England.

Venezuelan Oil Readily Available In Emergency, Perez Alfonso Says

International

OIL reserves of Venezuela "will be at the full disposal of those who fight for freedom and democracy" in the event of a future emergency, Juan P. Perez Alfonso, minister of fomento, declared this week in a letter to The Oil and Gas Journal.

Correcting a "misinterpretation" of an earlier statement, (*The Oil and Gas Journal, March 11, page 61*), Perez Alfonso declared:

"Venezuelan oil, made available without stint or limitation in World War II, played a crucial role in insuring victory for the United Nations. Venezuela is a member of the United Nations and a party to all the commitments entered into by the American republics. You may rest assured that in any future emergency our resources will be at the full disposal of those who fight for freedom and democracy."

In his earlier statement the minister said that the nation's crude-oil reserves would not be placed at the "unlimited disposal" of other countries. He said also that the country was not contemplating the granting of more concessions and said that future development of Venezuela's oil resources would be that most advantageous to the general interest.

These reservations, Perez Alfonso's letter said, apply "only to normal conditions and times. Our position would certainly be a different one were the collective peace, security, and stability of the American republics to be threatened."

The Venezuelan minister made it clear that Venezuela would show no "hesitation in cooperating with our sister republics of the Western Hemisphere," and declared "there is a real possibility of collaboration with American countries" that would allow continued study of her natural resources and more intensified planning to provide the most economic development.

Zisterdorf Fields Will Be Ruined by Russians in 2 Years, Commission Finds

AUSTRIA'S prolific Zisterdorf oil fields will be ruined within 2 years unless the Soviet occupation authorities halt their policy of overproduction and the removal of vital oil-field equipment.

This is a conclusion of an Austrian Government Commission which was appointed to investigate oil-field practices. The Zisterdorf fields have been the center of a stormy four-power battle over a peace settlement ever since 1945. Meanwhile, Russian occupation authorities, who have retained control of approximately 60 per cent of Russia's oil production, have continued to supervise operations.

Russia this year has exported about 12,100 bbl. daily out of Austria's total daily production of approximately 18,800 bbl., leaving Austria only 6,700 bbl. daily. An equally large percentage has been taken by the Soviets for the previous 2 years.

Because of inadequate maintenance and insufficient equipment, Austria's oil fields are steadily being flooded with water. To halt the ruin of that country's oil fields, the report stated, maximum annual production should be held down between 500,000 and 600,000 tons annually. This would approximate from 10,000 to 12,000 bbl. daily, compared with the current output of around 18,000 bbl. The commission estimated that the badly needed equipment would cost around $50,000,000.

Austria's highest crude-oil production was reached in 1944 with 1,214,000 tons, or 24,200 bbl. daily.

The Zisterdorf and sister fields of the Vienna Basin lie within 30 miles of the industrialized Austrian capital and its continent-linking Danube highway. In convenience, the position of the wells is somewhat comparable to that of oil centers near Pittsburgh, Pa.

Millionth Barrel of Crude From Persian Gulf Arrives

The millionth barrel of crude oil received by Socony-Vacuum Oil Co., Inc., from the Persian Gulf was delivered last week at the company's Paulsboro, N. J., refinery.

The millionth barrel was in a cargo of 110,000 bbl. unloaded from the tanker Plattsburg. The one-way trip for tankers from the Persian Gulf requires about 30 days, including loading and discharging time.

Imports are scheduled to average 17,000 bbl. daily the rest of this year and will increase gradually after January 1, 1949, to 40,000 bbl. Finished products made from Middle East crude will be marketed in New York, New England, and the Middle Atlantic states.

Egyptian Lease Covering Sudr Field Expected Soon

Within a few weeks the Egyptian Congress is expected to grant a lease to the Anglo-Egyptian Oilfields, Ltd., for the proven Sudr oil field. The Egyptian Ministry of Commerce and Industry has drawn up a bill authorizing the development of this area.

Article 2 of this bill provides that the concession should include the following conditions:

1. That the concession be for 30 years and renewable for another 15 years.
2. That Anglo-Egyptian pay the Egyptian Government a tax equal to 14 per cent of the value of the crude oil produced.
3. That the Egyptian Government have priority for buying 20 per cent of the production.

Authorization of this lease is not directly contingent upon passage of the newly projected Egyptian oil law, which is now in the committee of the lower house. It is expected that several weeks will pass before this bill reaches the Egyptian senate.

It is expected that the Egyptian Congress soon will authorize a similar lease for operation of the recently discovered Asl field. Asl is located about 10 miles south of Sudr on the Sinai Peninsula. Both fields are jointly operated by Anglo-Egyptian and Socony-Vacuum Oil Co., Inc.

Returning of Residual Oil To Ground in Iran Halted

Anglo-Iranian Oil Co., Ltd., is no longer returning residual fuel oil to the ground. Because of a lack of adequate tanker transportation, the company was forced to do this for a 6-month period, from last September until March.

During that time a total of 1,000,000 tons, or approximately 40,000 bbl. daily, was returned. Anglo-Iranian's Abadan refinery, the world's largest, is currently running 425,000 bbl. daily of crude oil. February crude-oil production in Iran averaged 433,600 bbl. daily.

Development of Casabe and Tibu Fields Boosts Total 1947 Output in Colombia

CRUDE-OIL production in Colombia climbed to 25,881,322 bbl. or approximately 76,500 bbl. daily, last year, representing a total increase of 3,323,115 bbl., or 9,100 bbl. daily, over the 1946 output and 577,527 bbl. more than the previous peak production of 25,303,795 bbl. for 1940.

These figures have just been made available through the American Institute of Mining and Metallurgical Engineers. The Colombia report was written by C. F. Dohm, chief geologist of Tropical Oil Co., at Bogota. The data was collected from Colombian Petroleum Co., Colombian Gulf Oil Co., Royal Dutch-Shell, Socony-Vacuum Oil Co. of Colombia, and Texas Petroleum Co., as well as Tropical.

Colombia's significant rise in production is due solely to the success of Shell and Colombian Petroleum Co. in developing their Casabe and Tibu fields. In 1946 Shell's Casabe field, in the Middle Magdalena Valley, produced 3,210,046 bbl. and Colpet's Tibu field produced 2,932,080 bbl. Last year the production from these fields was 4,775,610 and 4,574,508 bbl., respectively.

Tropical Output Down

Though the 1947 production of Shell and Colpet showed an appreciable increase over 1946, Tropical's output continued to decline, Dohm stated and explained:

"In 1946 Tropical Oil Co.'s production from its four fields in the De Mares concession was 13,718,956 bbl. In 1947 Tropical's production from the same fields was 13,169,044 bbl. As in 1946 the bulk of the production came from La Cira field. This field produced 9,551,000 bbl. during the year, and neighboring Infantas field, first discovery in Colombia, produced 3,480,782 bbl.

"Galan and Colorado together produced 137,261 bbl., the remaining total production from the De Mares concession. The only oil which reached tide water during the year was produced from the Barco concession, the De Mares concession and Yondo concession in which the Casabe field is located. The remaining production in Colombia was consumed in exploration and development operations."

The Colombian oil industry completed 139 development wells last year, of which 132 produced oil and 7 were dry holes. At De Mares Tropical completed the development of its two major fields, La Cira and Infantas. Eighty-two wells were drilled at La Cira, bringing the total wells in that field to 843. Thirteen wells were drilled at Infantas. No development work was carried out in the small Galan field but one well was completed in the Colorado field.

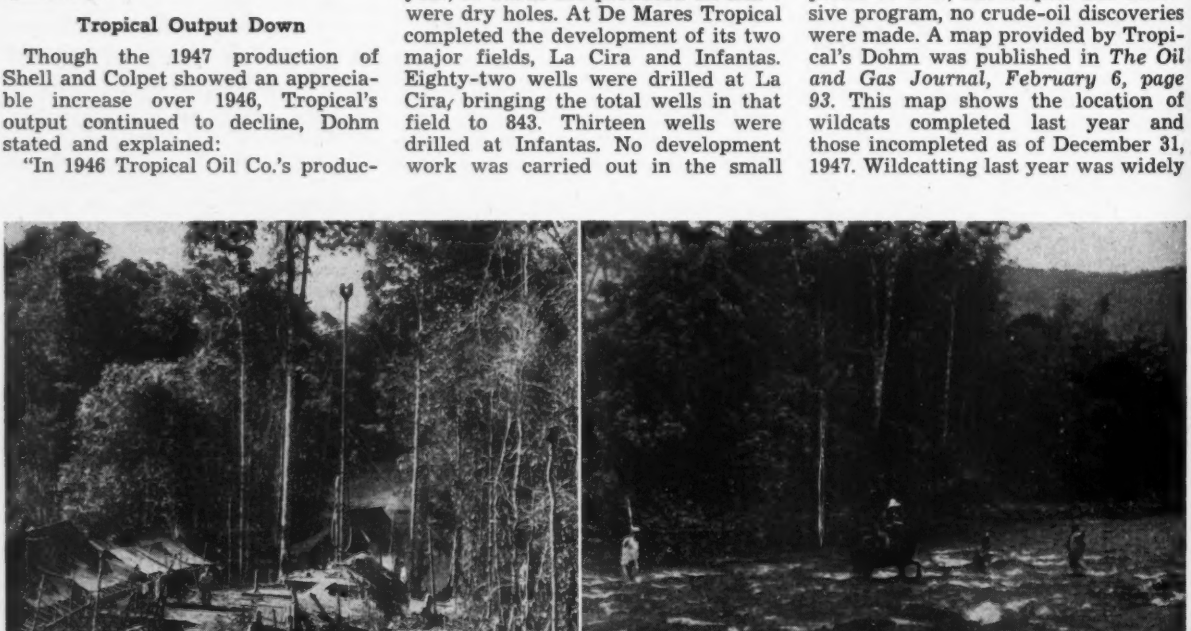
In the Barco concession, Colpet confined its development drilling to Tibu field, completing 21 wells during the year. Two of these were semiexploratory in that they tested Cretaceous horizons in parts of the field not previously penetrated. As a whole, Dohm explained, the results of the Cretaceous tests were discouraging. In Casabe field, across the Magdalena River from the De Mares concession, Shell continued rapid development drilling. The 18 wells drilled there during the year brought the total wells in this field to 71.

In Velasques field, up the river from Casabe, Texaco completed two wells during 1947. One of these was a dry hole and probably established the east limit of the producing area.

Floranto field, discovered in 1945 by the Sinu Oil Co. (jointly owned by Tropical and Socony-Vacuum) was abandoned last year because of its noncommercial character.

18 Wildcats Completed

Eighteen wildcat wells were completed in 1947, but despite this intensive program, no crude-oil discoveries were made. A map provided by Tropical's Dohm was published in *The Oil and Gas Journal, February 6, page 93.* This map shows the location of wildcats completed last year and those incompleted as of December 31, 1947. Wildcatting last year was widely



Left: One of Richmond Oil Co.'s "carry in" core-drilling rigs in operation in one of Colombia's jungle areas. Right: A geological exploration crew operating in the Llanos area of eastern Colombia

distributed. But of more significance is the fact that these different horizons were tested under many different structural conditions.

In the very large Llanos basin, a relatively unexplored sedimentary area east of the Andes, three wells were completed last year and two were drilling at the year's end. Tropical's 1 Chaviva, in the eastern part of the basin, was abandoned as a dry hole at 7,824 ft. No shows of oil or gas were recorded. In the southwestern part of the basin, near the eastern foothills of the Andes, Shell's 5 San Martin, located near Nos. 3 and 4, was drilling at 5,135 ft., and its 1 Voragine, located in the southern end of the basin, was testing. At its total depth of 6,482 ft., the Voragine well was in basement.

Although Tropical suspended operations in the Llanos last year, it is likely that the discovery of oil in Socony-Vacuum's 2 San Silvestre, located about 125 kilometers, 78 miles, north of the Colombian Llanos, in Venezuela, will be an incentive to other operators to accelerate their Llanos activities. The discovery well lies in the Venezuelan-Apure basin which is the northern continuation of the Colombian Llanos.

Deep Test Spudded

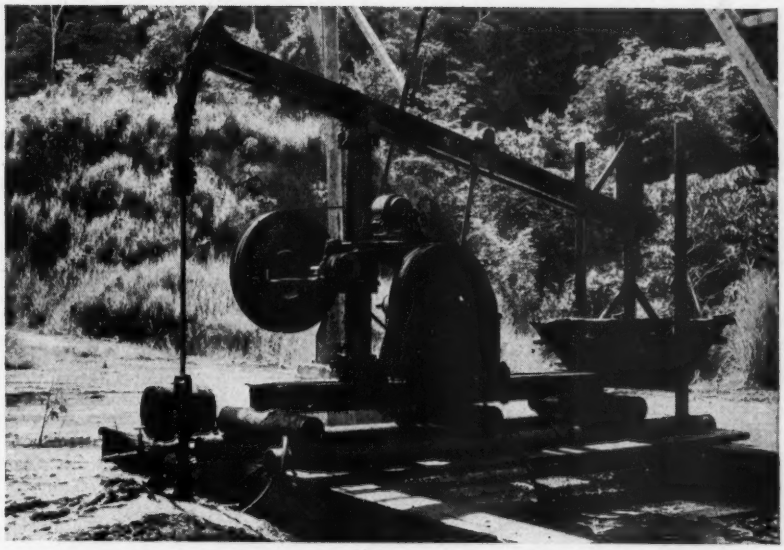
Toward the end of 1947 Tropical spudded a well near the town of Tunja, on the Bogota Plateau, about 150 kilometers, 94 miles, north of Bogota, as a deep test for Cretaceous production. This is the first well ever to be drilled in the high plateau area of the eastern Colombian Llanos. As of April 3, this well was down to 2,721 ft.

Only one wildcat was active last year in the Upper Magdalena basin area. This was the 1 San Antonio, a joint Tropical-Texaco well located east of the Magdalena River. As of April 28, this well had been drilled to 8,363 ft. without encountering any showings of oil or gas.

Six wildcats were completed in the Middle Magdalena basin area during the year and none were drilling at the end of the year. Five of the six wells were drilled by Gulf Oil Co. and were abandoned as dry holes. The sixth, 11 Cantagallo, was drilled by Socony-Vacuum and also abandoned as a dry hole.

In the Lower Magdalena basin, five wildcats were completed last year and two were drilling at the year's end. The joint Texaco-Socony-Vacuum well, 1 Pinto, located in the southern part of the basin, was abandoned as a dry hole in Oligocene strata at 11,206 ft. This well had several showings of high-pressure methane gas but no showings of oil.

The Ariguani Co.'s 1 Granada, located 15 kilometers, 9 miles, north of 1 Pinto, was lost at 3,870 ft. as a result of a gas fire. It was estimated that the well was making from 50,000,000 to 75,000,000 cu. ft. of gas daily while it was burning out of control. This company's 2 Granada, a 100 meter offset to No. 1, was drilling at 1,427 ft. in Miocene strata at the end of the year.



The surface geology of El Centro field, where this well is located, is so broken by patternless hills and valleys that the conventional Catalina pumping stations are impossible, and many wells have to be pumped individually by electric-powered rigs

Shell's 17 El Dificil, located approximately 2 kilometers, 1 mile, south of the proved El Dificil area, was abandoned as a dry hole in basement at 9,528 ft. Several showings of oil were recorded in the well but testing failed to obtain production. Texas Co.'s 1 Buenavista, located in the north central part of the basin about 50 kilometers, 31 miles, east of Barranquilla, was drilled to 11,280 ft. in Tertiary strata at the end of the year. This well was abandoned in April at 11,590 ft. while still in the Tertiary.

In the northwestern part of the Lower Magdalena basin, Tubara Oil Co. (subsidiary of Tropical and Socony-Vacuum) abandoned 1 Tubara and 2 Tubara as dry holes. Both of these wells had encouraging showings of medium gravity oil while drilling but failed to produce upon being tested.

In the Cesar Valley basin, Tropical abandoned its 1 El Paso in basement at 2,927 ft. No showings of oil or gas were recorded. Tropical's 2 El Paso, located about 20 kilometers, 12 miles, north of No. 1, was recently cored at 3,738 ft. In the Papayal basin, the first wildcat ever to be drilled in this small intermontane basin was abandoned by Tropical at 2,900 ft. in basement.

Three Completed in Sinu

Three wildcats were completed last year in the Sinu basin. In the noncommercial Floresanto field, Sinu Oil Co. (subsidiary of Tropical and Socony-Vacuum), completed its deep test, 10 Floresanto, and abandoned it as a dry hole in Oligocene strata at a total depth of 10,876 ft. Twenty kilometers, 12 miles, to the east in La Risa concession, the same company abandoned its 1 La Risa. Neither of these wells had significant oil or gas showings. Texas and Socony-Vacuum also abandoned 1 Tablon, a joint operation, in the eastern part of the Sinu basin as a dry hole. This well had a large showing of dry gas. The Texas-Socony-Vacuum 1 Jobo, located near 1 Tablon, was down to 6,944 ft. at the end of last year and was fishing. Since then, this well has been plugged back to 6,842 ft. and early in May was testing at intervals. An open-hole test was made below 6,503 ft. but showed only salt water.

The nearby wildcat, 1 San Andres, was drilling at 5,135 ft. in Cretaceous strata at the end of the year. Around March 15 this well was abandoned at 7,400 ft. The 1 San Andres operation was carried out by Cia. Unidas de Petroleo, S.A., which is owned by Cities Service Co., Sinclair Oil Corp., and Richfield Oil Corp.

Last year the oil industry in Colombia completed 488 party months of geological surveys, 72 party months of gravity meter surveys, and 133 party months of seismic surveys. In addition, Gulf started an extensive airborne magnetometer survey of northern and eastern Colombia which is being carried out by Fairchild Aerial Surveys, Inc.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Target: Supreme Court

WASHINGTON.—If the tidelands legislation comes up for debate in the Senate this session the Supreme Court may get the most thorough going over it has received since President Roosevelt, more than a decade ago, precipitated the "court packing" fight.

Never noted for the unanimity of their outlook, the members of the court in recent years have been so badly split that fewer than half their decisions have been unanimous. So far this term 80 cases have been decided, but it took a total of 145 opinions, including 44 dissents and 21 concurrences, to dispose of them. In the tidelands case itself last year, Justices Frankfurter and Reed wrote dissents and Jackson took no part in the decision.

Some members of Congress have kept their own score cards on the court and have carefully watched the tenor of decisions, some of which, they say, have approached the illogical.

The New Deal charge that the Supreme Court was reactionary certainly couldn't be repeated today. There is no doubt of the court's position on big business in the light of recent opinions which have gone so far as to hold illegal a quantity-price discount schedule under which there is merely a "reasonable possibility" that some one may be hurt.

Another case in point is the court's approval of things the Federal Power Commission has done while condemning the means by which the commission did those things.

The battle over the court may be so bitter as to overshadow the relative merits of state and federal claims to the oil under the tidelands, even though there is nothing Congress can do to bring about a change in either the membership or viewpoint of the court.

Oil Speaks Its Mind

THE Commission on the Organization of the Executive Branch of the Government, headed by former President Herbert Hoover, is out to find out what is wrong in the administration of the federal departments and is giving members of the oil industry a chance to voice their criticisms.

The investigation was ordered by Congress in July 1947, and the commission is to submit its report and recommendations by next January.

One phase of the inquiry goes into the administration of federal functions with respect to natural resources, and is being conducted by a seven-man advisory committee headed by former Wyoming Gov. Leslie Miller. J. R. Mahoney, research director for the group, recently sent a letter to trade association and other interests in the oil industry, soliciting their views and recommendations on seven specific subjects.

The commission, Mahoney explained, is required not only to include in its report a description of the present functions of the Government and an analysis of the way they are being administered, but also must determine what changes are necessary to promote economy, efficiency, and improved service in the transaction of public business. Because of the vast field to be covered and the limited time available, it will be impossible to hold hearings or provide other means that would give all those interested full opportunity to present their views in person, although there will be some consultations later on the basis of written reports and recommendations.

Members of the industry who long have griped over the manner in which the Interior Department handles its leasing responsibilities and have charged that the Government is constantly invading fields that should be left to state or local governments or private enterprise, accordingly, are expected to have a field day in dealing with the seven subjects on which their views have been solicited:

1. Evidences of satisfactory administration of federal functions
2. Evidences of inefficiency in government services.
3. Overlapping and duplication of services or functions.
4. Conflicts and rivalry among departments and agencies.
5. Functions being performed by the federal Government that should be left to states and local governments or private enterprise.
6. Suggested changes in federal organization and administration.
7. Plans for improved coordination of federal programs.

Short-Handed FPC

THE chances are good that the vacancy on the Federal Power Commission to which Thomas C. Buchanan of Pennsylvania has been nominated by President Truman will not be filled until next year.

In the effort to adjourn the session next month, congressional leaders have adopted a policy under which no nomination which is likely to be opposed on the floor will be brought before the Senate, this aside from the effort to confirm no Truman nominations for policy-making posts until the November elections show which party will control the Government next year.

Buchanan, who once served on the Pennsylvania Utilities Commission, is not held in especial esteem by Sen. Edward Martin of that state, and other senators interested in the power commission also object to the President's selection.

To members of the natural-gas industry, Commissioners Claude L. Draper and Leland Olds represent the "left" on the commission and Buchanan would be still further away from the center on that side. They would have preferred to see Burton N. Behling, the President's first choice for the job, who directed the natural-gas investigation and the reports in which Commissioners Nelson Lee Smith and Harrington Wimberly concurred, win the post.

If Buchanan's nomination does get to the floor of the Senate, some of the members interested in enactment of the bill to revamp the Natural Gas Act are expected to put up strong opposition to his confirmation. Because the opposition will develop into a long drawn-out debate which might stall action on "must" legislation, it is considered likely that the nomination will be held in committee.

Unknown Factor

DEFENSE officials have not yet reached any conclusions as to the effect of expansion of the armed forces on military petroleum requirements, but are agreed that it will be probably some time in the fall before demand begins to increase, and the full effect of the larger Army and Navy will not be felt until after the turn of the year.

If the drafting of men is ordered, it will require some time to get the machinery for registration set up and still further time before the first call can be sent out. Expansion of the Air Force to 70 groups, as provided for in legislation approved by Congress, also will require many months.

The industry, accordingly, will have considerable time in which to prepare itself for increased military demands and is expected to do a lot of planning on its own as to how they can be met without interfering with the civilian supply.

Estimates of the additional oil which the military expansion program will

involve range as high as 25 per cent over the most recent estimate of some 117 million barrels required for fiscal 1949, but the impact on the oil industry will not be apparent until it is determined what the increase will be in the individual products, particularly gasoline, kerosine, and light heating oils.

No Oil Desk in ECA

AN acting director of the industry division of the Economic Cooperation Administration was appointed last week, and efforts are being made to enlist the services of a number of industry experts to supervise European recovery shipments of major commodities, but it does not seem likely that a special petroleum desk will be set up.

Petroleum is expected to be handled as part of a basic-commodity group. An experienced oil man probably will be brought into the organization to supervise oil procurement by the participating countries, but ECA officials say that right now they are trying to get their experts appointed and then sit down with them and discuss what they are to do.

The industry groups in Washington will propose measures to the special representative's staff in Paris to carry out the program and will review plans submitted by the European countries for increasing industrial production.

A major part of the work will be concerned with existing and proposed industrial facilities and here, after determining the reasonableness of assistance requests but before approving any plans calling for scarce equipment from the United States, the industry groups will make sure that such equipment can be supplied without upsetting domestic markets.

China was the first recipient of an authorization for shipment of petroleum under the recovery program, but authorizations for shipments to the Western European countries are expected to start moving almost immediately.

Court Upholds Right of Reynosa Pipe Line Co. to Export Gas to Mexico

HOUSTON.—A three-judge federal Circuit Court in New Orleans has upheld a 1946 Federal Power Commission order authorizing Reynosa Pipe Line Co. to export Texas natural gas to Monterrey, Mexico.

A prolonged fight against the Reynosa project has been carried on by the Texas Railroad Commission and a competitive Mexican gas company, Cia. Mexicana de Gas, S.A. Whether they will appeal the New Orleans decision has not been decided.

The Fifth Circuit Court of Appeals in New Orleans held there was no evidence of arbitrary or unreasonable action by FPC in granting the permit under which Reynosa is now exporting 50,000,000 cu. ft. daily for Monterrey industrial firms. "Nor can we agree with the petitioners that they stand in any stronger position on their complaint that the hearing was unfair and was conducted in such disregard of the basic concepts of fair play that they were denied a full and fair hearing," the Circuit Court said.

The gas-export project, which led to the case, was planned in 1944. Reynosa, an affiliate of La Gloria Corp., Corpus Christi, contracted with a Mexican corporation, Gas Industrial de Monterrey, S.A., for the sale of gas produced in La Blanca and South Weslaco fields, Hidalgo County, Texas, by La Gloria. Reynosa agreed to build a 30-mile line to the international border at Reynosa, and Gas Industrial obligated itself to construct a connecting 135-mile line from Reynosa to Monterrey.

In several FPC hearings, the proposal was opposed by members of the Railroad Commission and Cia. Mexicana de Gas as being contrary to the public interest.

FPC on June 6, 1946, issued an order authorizing the export of gas and subsequently gave Reynosa a certificate of public convenience and necessity permitting it to construct and operate the line from the Hidalgo County fields to the border. The line went into operation in July 1947. It and the Mexican line of Gas Industrial supplies 17 industrial concerns in Monterrey.

Cia. Mexicana, which joined the Texas commission in attacking the export order granted Reynosa, has been engaged in transporting gas to Monterrey and selling it to domestic and industrial consumers there since 1929. Its gas is purchased at the border from United Gas Pipe Line Co. The same day FPC issued the Reynosa export authorization, it also authorized United Gas Pipe Line to continue its Monterrey exports through Cia. Mexicana.

Members of the staff of The Oil and Gas Journal and its Spanish-English affiliate, Petroleo Interamericano, are shown here before the booths of the two publications on the I.P.E. grounds. The picture was made shortly after conclusion of the opening ceremonies May 15

First-Quarter Products Exports Less Than Half of 1947 Figure

WASHINGTON.—Exports of major refined products in the first quarter this year were cut to slightly less than 50 per cent of those for the corresponding period in 1947, Acting Secretary of Commerce William C. Foster told Congress last week in a quarterly report on export control.

Total exports of products were 9,830,000 bbl. compared with 19,861,000 bbl. a year ago, the report showed. Crude exports, however, were slightly larger, 8,400,000 bbl. against 8,323,000. The final allocations for the quarter were 1,045,000 bbl. of crude and 8,540,000 bbl. of products, the difference between those figures and the actual exports apparently representing shipments to Canada, which are not under export control.

In cutting back the export quota for the quarter from its original figure of 11,850,000 bbl. of products to 8,540,000 bbl., Foster said, the department went as far as it could and "further cuts would probably have resulted in the curtailment of essential industrial activity in many countries, which are wholly or largely dependent upon the United States for their supplies of petroleum products."

Legislation Detrimental

Because of that, he said, enactment of any of the measures introduced in Congress calling for an embargo on exports would have had detrimental effects upon our foreign policy that would have far outweighed any possible benefit to the domestic economy.

Foster tied the oil and steel export programs together, explaining again the belief that the supply of pipe for the trans-Arabian pipe line will develop greater benefits for the United States than the use of the pipe here.

"The basic obstacle to improving the petroleum supply-demand position of the United States and the rest of the world in the near future is the limited availability of steel for the expansion of production and transportation facilities," he said. "Steel is needed for drilling and connecting new wells, enlarging refinery capacity, laying pipe lines, and building tankers and tank cars.

"In view of the prospect for continued steel shortages, and the need for stretching our steel supply as far as possible, it is necessary to recognize the fact that by devoting a given quantity of steel to a petroleum project abroad, total petroleum output may be increased to a far greater extent than if that limited tonnage were retained for use in the United States."

From the standpoint of interest of the United States, he said, it is essential for sound economic and strategic reasons to reduce the dependence of much of the rest of the world upon the Western Hemisphere as a basic source of supply, and the Middle East is the only other area with proven reserves sufficient to assume the major share of that burden. The national interest also requires that we lend support to the expansion of petroleum products in Latin America by the shipment of limited amounts of steel, since the domestic demand has increased so tremendously that we must import substantial quantities, chiefly from oil fields in Latin America.

Tidelands Bill Dealt New Blow in Senate

WASHINGTON.—A new threat to enactment of the tidelands legislation was seen by oil men last week in efforts of electric utility interests to have the measure, not yet acted upon by the Senate, amended to define more clearly the federal authority which it is stipulated is not to be affected by the legislation.

Representatives of the utilities have taken the position that the bill, as written, might be construed at some future date to give the Federal Power Commission some authority which it is not now considered to possess with respect to hydroelectric development.

Supporters of the measure are considerably worried over the situation, which adds a new and serious hazard to the several others which the bill must surmount before it can become law.

They fear that the power interests' stand will be seized upon by opponents to delay the bill in the Senate judiciary committee and on the floor of the Senate. The probable strategy, when the bill comes up for floor consideration, will be to substitute the measure already passed by the House and thus avoid sending the bill to conference, where it might still be tied up when adjournment comes.

Friends of the legislation admit that it will have a hard time getting through the Senate, where only a slim chance is seen of over-riding a presidential veto. They are anxious to avoid injecting any new issues into the controversy, particularly one which might be represented as designed to limit federal authority and thus offer another reason for White House rejection.

McClure Named Head Of Mississippi Board

JACKSON, Miss.—At its organization meeting here last week, Mississippi's new state Oil and Gas Board elected James McClure, Sardis, Miss., attorney, chairman, and reappointed H. M. Morse to the post of state oil and gas supervisor.

The new board was created by the 1948 Mississippi legislature to replace the former ex-officio group consisting of the governor, the attorney general, and the state land commissioner. Morse has been state supervisor and secretary of the board since 1938.

Will C. Leonard, Kosciusko merchant, was chosen vice president of the new board. Other members are former Gov. Hugh White, Columbia; William Maynard, Clarksdale attorney; and Walter G. Johnson, business manager of the Jackson Daily News.

Organization of the new board was further completed with the appointment of John Stone, assistant attorney general, as legal adviser. Funds for the administration of the new oil and gas statute will come from a 2-mil assessment per barrel on Mississippi oil production and 1/10 mil per 1,000 cu. ft. assessment on gas. This is expected to raise $90,000 annually.

A.P.I. Group to Study Production Problems

A study of production problems and progress in oil-field practices and inspection trips of the Rocky Mountain district will highlight the 2-day spring meeting of the Rocky Mountain district of the American Petroleum Institute's Division of Production in the Townsend Hotel, Casper, Wyo., May 27-28.

Production Division Chairman Jake L. Hamon, of Cox & Hamon, Dallas, Tex., will speak on "Developments and Trends in Oil-Field Producing Practices," at the opening session on the afternoon of May 27. Six papers, three each for morning and afternoon sessions, will be included on the program for the second day of activities.

H. A. Stewart, of The Texas Co., Denver, chairman of the Rocky Mountain district has appointed James D. Anderson, Ohio Oil Co., Casper, Wyo., as chairman of the general arrangements committee. Fred M. Manning, Jr., of Fred M. Manning, Inc., is chairman of the program committee.

Date of Next Exposition Withheld Pending Poll of All Exhibitors

NO decision as to when the next oil show will be held is to be announced until a poll of exhibitors has been completed. This decision was made at breakfast to exhibitors at Drillin' Inn May 17 given by exposition officers at which those present were asked to express their opinion as to the desired interval for future shows. In the early years, expositions were held annually and later biannually.

Following the breakfast several of the larger exhibitors said they favored a quadrennial exposition. They explained that there were not sufficient new developments in equipment to justify a more frequent showing. The increasing costs to exhibitors also were mentioned as a reason for the 4-year program.

W. G. Skelly, president, explained to the exhibitors that "this is your show" and said the officers and directors had no desire to hold an exposition any oftener than was justified by conditions. He praised the exhibitors for the type of exhibits presented at the exposition now under way and said they reflected credit on the entire industry. The Petroleum Equipment Suppliers Association, to which many of the exhibitors belong, tendered its services in aiding the exposition officials in determining when the next show should be held. The annual meeting of the association will be held at Colorado Springs, Colo., June 6-8.

It was explained that if the exposition is held on a 4-year schedule it will be necessary to increase space rates due to the cost in maintaining the present exposition plant, which has no other use and which represents an estimated replacement cost of $3,000,000.

It was also decided to obtain the opinion of exhibitors as to the length of time the exposition should be held. Due in part to the housing problem some exhibitors favor holding the exposition over a 2-week period or longer. It was explained that it was impossible to extend the time of the present 8-day show.

Other suggestions included an arrangement whereby certain classes of exhibits would be grouped by areas, thus enabling visitors more conveniently to see the equipment in which they are particularly interested. In connection with the criticism of the handling of rooms for exhibitors and visitors it was urged that the oil industry be represented on the housing committee.

Construction of Fourth Middle East Big-Inch Line Planned by Gulf, Shell

BY 1955 Gulf Oil Corp. and a Royal Dutch-Shell subsidiary hope to have a big-inch crude-oil pipe line completed from Kuwait to some point on the eastern Mediterranean Sea. Preliminary plans call for a line capable of carrying 300,000 bbl. daily. This will be the fourth big Middle East crude-oil line.

The Gulf-Shell line will be in addition to the projected 34-36-in. line of Middle East Pipe Lines, Ltd., which also is being designed to carry crude oil from Kuwait as well as from Iran.

As a pipe line of the dimensions planned by Gulf and Shell will have to be fabricated in the United States, an official of one of the companies involved told The Oil and Gas Journal that this line won't be built until completion of the present trans-Arabian line, the line of Middle East Pipe Lines, Ltd., and the proposed Kirkuk-Mediterranean line.

All of these carriers fall into the big-inch category. *(For a discussion of Middle East Pipe Lines, see The Oil and Gas Journal, September 20, 1947, page 158.)*

Union Hikes Price of Crude in Two Fields

LOS ANGELES.—Union Oil Co. of California has announced a crude price increase of 5 cents per barrel for oil it buys in Rosecrans and Dominguez fields of Los Angeles County. The boost, according to company officials, was designed to bring the price paid for Rosecrans and Dominguez oil more nearly up to the price paid for oil of comparable gravities in other fields of the Los Angeles basin. The increase was made retroactive to May 1.

Under the new schedule 24°-gravity oil will bring $2.31 per barrel, 25°-gravity $2.35, 26°-gravity $2.39, 27°-gravity $2.43, 28°-gravity $2.47, and up to $2.75 for 35°-gravity crude.

New-Capital Requirements Of Oil Industry Stay High

Capital expenditures of 30 representative oil companies in 1948 are requiring that more than $400,000,000 of net new capital be raised, according to Dr. Joseph E. Pogue, vice president of Chase National Bank.

Speaking before a luncheon meeting of the Savings Banks Bond Men in New York, Pogue said that about half of this amount already has been acquired and that the major part of the funds is being obtained from banks and insurance companies.

Referring to last year's record in comparison, Pogue said that despite higher prices and earnings, these companies, after plowing back approximately two-thirds of their net income, found it necessary in 1947 to raise $485,000,000 net from capital markets to round out the funds needed for replacements and expansion of facilities and to increase working capital.

State Gasoline Taxes Double Federal Revenue

WASHINGTON.—The 48 states and the District of Columbia last year collected more than twice as much from taxes on gasoline than did the federal Government, it was reported May 16 by the Public Works Administration.

Whereas federal gasoline-tax collections for the year were $455,350,210, the states received $1,199,718,000 and, with license, inspection, and other fees, received a total of $1,206,305,000, the report showed.

The gasoline passing through state taxing channels last year amounted to 32,751,954,000 gal., against 30,138,041,000 in 1946.

Wyoming Well Sets World Production Depth Record

DENVER.—A new world record for the deepest producing oil well was established last week-end by Pure Oil Co. The well, 1 Unit, NW SE 11-33n-84w, a deep test in West Poison Spider field of Natrona County, Wyoming, on drill-stem test through a 47/64-in. choke on 2⅞-in. drill pipe, flowed 34 bbl. per hour of 44°-gravity oil from 120 ft. of Frontier sand at total depth of 14,211 ft. for 41 hours.

Test was made through 7-in. casing set at 13,791 ft., with production packer on drill pipe at about 13,600 ft. The last 24-hour gage was 835 bbl., or 34.8 bbl. per hour.

PERSONALS

Finney Serves as Head of Two Oil Companies

PRESIDENT of the recently created Salt Lake Refining Co. and Salt Lake Pipe Line Co. is C. E. Finney, Jr., who is also a vice president of the parent company, Standard Oil Co. of California.

Finney, who graduated from Cornell University in 1912, joined Standard in 1919, following active overseas Army service. From that time he held a series of positions of increasing importance at the Richmond, Calif., refinery, becoming assistant superintendent in 1928 and later manager of pressure distillation.

In 1931 he was named manager of the subsidiary Pasotex Refinery at El Paso, Tex., and the following year returned to Richmond as manager of that refinery. He was made assistant to the general manager of the manufacturing department in the company's home office in 1937 and general manager in 1943. He became a vice president in 1946.

In his new position, Finney will direct construction and operation of the new Salt Lake pipe line, a 182-mile line from Rangely, Colo., to Salt Lake City, and the new Salt Lake refinery. Both projects are scheduled for completion in November and will be built at an estimated cost of $5,000,000 each. The pipe line will consist of 168 miles of 10-in. pipe and 14 miles of 8-in. line, and will be used primarily for transportation of crude from Rangely field to the Salt Lake City area for the purpose of processing the Rangely crude.

Perry L. Nunley, Penwell, Tex., district foreman for Skelly Oil Co., was awarded a new Buick May 19 by Franks Manufacturing Corp. as winner of a jingle contest conducted by Franks. The award was made at the International Petroleum Exposition by **Carl White, Jr.,** Franks president.

Recently elected personnel to high positions with Continental Oil Co. following a board of directors meeting at New York include: **R. L. Bosworth,** formerly vice president and treasurer, Ponca City, Okla., to financial vice president; **E. F. Battson,** formerly assistant to the president, to vice president, with headquarters in New York; **Serge B. Jurenev,** formerly secretary, assistant treasurer, and New York office manager, to secretary-treasurer; **E. J. Sheldon,** director of service divisions, Ponca City, to assistant treasurer; **Thomas F. Dowd, Jr.,** formerly assistant treasurer, Ponca City, to controller; **L. E. Teverbaugh,** formerly supervisor of internal auditors, to general auditor to succeed **G. T. Bodman,** with headquarters in Ponca City.

Gilbert Akin, drilling superintendent for Iraq Petroleum Co., Ltd., is in the United States on his first extended vacation in 10 years. He plans to visit Colorado and California after attending the International Petroleum Exposition in Tulsa before returning to Qatar, where he has been for the past several months. Akin was formerly drilling superintendent for Anglo-Egyptian Oilfields, Ltd.

Preston Ware, formerly with Baldridge & King in McAllen, Tex., is in charge of the geological office which **Herman** and **George R. Brown,** Houston independents, have opened in Corpus Christi.

W. W. Wright, New England regional manager of Sun Oil Co., has been elected chairman of the Oil Industry Information Committee of New England for a term of 1 year. During the war he was chairman of the district and marketing committee, Petroleum Administration for War, District 1. **Roland L. Wentworth,** general manager of the Petroleum Heat & Power Co., Boston, Mass., was elected vice chairman of the district committee. **Ray B. Smith,** district manager of Gulf Oil Corp., Brewer, Me., was elected Maine State chairman and **Carl E. Small** was named Connecticut State chairman.

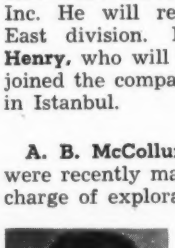
Dr. C. E. Decker, Dr. A. J. Williams, and **Dr. O. F. Evans,** of the University of Oklahoma School of Geology, will be honored commencement day, May 31, in recognition of "over 25 years of distinguished service." **Dr. E. L. DeGolyer,** graduate of the School of Geology, will be commencement speaker the evening of May 31.

William B. Jupp, manager of marine construction and repair, Socony-Vacuum Oil Co., Inc., has been elected chairman of New York Metropolitan section of the Society of Naval Architects and Marine Engineers for the 1948-49 season. **Arthur M. Lissenden,** assistant manager of Socony-Vacuum's marine construction and repair division, will head the auditing committee.

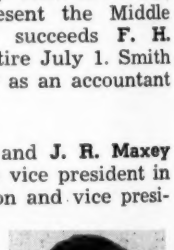
Kenneth Ford, formerly petroleum engineer with J. S. Abercrombie Co. at the Old Ocean field office, Sweeny, Tex., has joined the new Houston consulting firm of J. R. Butler Co. effective May 15.

Francis M. Smith has been appointed a member of the foreign trade committee of Socony-Vacuum Oil Co., Inc. He will represent the Middle East division. He succeeds **F. H. Henry,** who will retire July 1. Smith joined the company as an accountant in Istanbul.

A. B. McCollum and **J. R. Maxey** were recently made vice president in charge of exploration and vice president in charge of operations, respectively, of the newly formed Wichita Exploration Co., Wichita Falls, Tex. President and treasurer of the company is **Charles A. Breitung.**



A. B. McCOLLUM



J. R. MAXEY

Everett B. Roudebush, scout for Gulf Oil Corp. for the last 3 years operating out of the Oklahoma City office, has been named chief scout for Gulf with offices in Tulsa. He succeeds the late William R. Thawley. Roudebush joined Gulf in 1938 and served as scout in the Illinois-Indiana-Michigan region before entering military service.

J. M. Bradley, assistant division manager of Interstate Oil Pipe Line Co., has been loaned to Trans-Arabian Pipe Line Co. and will have headquarters in San Francisco.

HAROLD BURROW

Harold Burrow, purchasing agent for Tennessee Gas Transmission Co., Houston, has been named to the new position of director of purchasing. **L. C. Sonnen,** formerly special assistant purchasing agent, has become purchasing agent. Burrow was purchasing agent for Chicago Corp. before joining Tennessee Gas Transmission.

V. C. Perini, Jr., of Abilene, Tex., has been named the new president of the West Central Oil and Gas Association.

A. N. MacKenzie, western manager of production and exploration for British-American Oil Co., Ltd., has been transferred to Toronto, being succeeded at Calgary by **J. J. Statler** of Fort Worth.

H. H. Hewetson has been reelected president of Imperial Oil, Ltd. Other officers reelected were **G. L. Stewart,** chairman of the board; **O. B. Hopkins, J. R. White** and **K. I. Henderson,** vice presidents and all last year's directors. **F. G. Hall** was elected a vice president and **M. L. Haider,** general manager of the producing departments, was elected a director.

Ira A. Marshall, Jr., engineer trainee for Shell Oil Co., Inc., at the Los Angeles office, has been promoted to junior mechanical engineer, at Long Beach. Other promotions and transfers in the production department include: **Guy McKinley,** well puller, Long Beach, to head well puller; **Weare C. Little,** gas testing engineer, Oilfields, transferred to Bakersfield; **Willis C. Nidever,** production engineer, Los Angeles, to assistant division gager, Long Beach; and **Robert J. Woodward,** junior production engineer, Ventura, to Long Beach.

J. B. Hudson, petroleum geologist with Humble Oil & Refining Co., has been elected president of the New Orleans Geological Society. Other new officers include **Fred Goerner,** California Co., vice president, and **Ame Vennema,** secretary-treasurer.

C. M. Hinton, assistant division petroleum engineer, South Texas division, producing department, The Texas Co., and **Alvin J. Martin,** assistant district superintendent in Illinois, Oklahoma division, have been transferred to Texaco Exploration Co. in Calgary, Alta. Hinton will take charge of petroleum engineering operations of the exploration company. **Herbert E. Treichler, Jr.,** assistant superintendent, eastern district, South Texas division, will succeed Hinton as assistant division petroleum engineer in Houston. Martin will become superintendent of field operations of Texaco Exploration.

E. E. Pyles, Jergins Oil Co., Long Beach, Calif., has been elected president of the San Joaquin Valley Oil Producers Association.

Bert J. Thompson, formerly a chemical engineer with Stanolind Oil & Gas Co., has joined the manufacturing department of Warren Petroleum Corp. as process engineer. A graduate of Oklahoma A. & M. College in 1939 Thompson joined Phillips Petroleum Co. in the natural-gasoline and gas department as a manufacturing engineer, first at Borger, Tex., and then at Bartlesville, Okla. After nearly 8 years with Phillips, he resigned to accept a position with Stanolind.

A. J. Ruthven-Murray has been elected to the board of directors of Trinidad Leaseholds, Ltd., London, and appointed assistant managing director of the company.

Dr. Charles L. Thomas, director of Great Lakes Carbon Corp., has been elected chairman of the Chicago section of the American Chemical Society. Before joining Great Lakes Carbon he was research chemist and associate director of research for Universal Oil Products Co., Chicago.

Recent promotions and transfers in the engineering section of the production department of Stanolind Oil & Gas Co. include: **Clarence L. Kelley,** production foreman, North Cowden field, Odessa, Tex., to senior petroleum engineer, North Texas-New Mexico division office, Fort Worth; **Rexford E. Cheek,** junior petroleum engineer, general office, Tulsa, to field engineer, Hugoton field, Ulysses, Kans.; **Ray S. Fellows, Jr.,** petroleum engineer to field engineer, Hastings field, Alvin, Tex.; **John D. Culp,** field engineer, Hobbs field, Hobbs, N. M., to petroleum engineer, general office, Tulsa.

Raymond O. Courtright, Jr., petroleum engineer, North Cowden field, Odessa, to field engineer, Hobbs field, Hobbs; **Frank A. Martin, Jr.,** petroleum engineer, Elk Basin field, Elk Basin, Wyo., to field engineer, Pine Island field, Vivian, La.; **John E. Lang,** field engineer, Rangely field, Rangely, Colo., to petroleum engineer, general office, Tulsa; **Glenn H. Lancaster,** petroleum engineer, Salt Creek field, Midwest, Wyo., to field engineer, Rangely field, Rangely; **Bryan E. Mitchell, Jr.,** junior petroleum engineer to field engineer, Turtle Bay field, Liberty, Tex.

Gus F. Obenhaus, Jr., junior petroleum engineer to field engineer, High Island field, High Island, Tex.; **Alfred E. Barry,** petroleum engineer to field engineer, Anse La Butte field,

Here are the participants in the Houston Geological Society's annual student awards contest held May 13. The contest was based on technical papers of Texas A. & M. College seniors. Left to right are: S. A. Lynch, head of the A. & M. department of geology; John Honea, Houston; Joe Carter, Marshall, Tex.; James D. Driskill, Palestine, Tex.; Harold G. Van Horn, Homer, La.; and A. B. Stevens, department of petroleum engineering professor. Van Horn and Driskill participated for the petroleum engineering award. Van Horn won with his paper, "Gas Hydrates." Honea and Carter were in the geological contest. Honea won with a paper, "Effects of Sedimentation of Marine Organisms of the Gulf Coast of Texas." Judges were five prominent Houston oil-company executives: George Sawtelle, Kirby Petroleum Co.; Morgan Davis, Humble Oil & Refining Co.; Dr. Roy Morse, Shell Oil Co., Inc.; Harold Decker, Pan American Petroleum Co., and E. R. Filley, The Texas Co.

PERSONALS

Lafayette, La.; **Thomas L. Cullom, Jr.,** petroleum engineer, Woodsboro field, Woodsboro, Tex., to field engineer, Spindletop field, Beaumont, Tex.; **William C. Wilhite,** petroleum engineer, Turtle Bay field, Liberty, Tex., to field engineer, Hackberry field, Hackberry, La.; **Thomas H. Jenkins,** senior mechanical engineer, general office, Tulsa, to the Texas-Louisiana Gulf Coast division office, Houston.

Clifford W. Trice, petroleum engineer, general office, Tulsa, to division office, Houston; **Frank C. Folger, Jr.,** petroleum engineer, general office, Tulsa, to Hendrick field, Wink, Tex.; **Paul L. Terwilliger,** petroleum engineer, general office, Tulsa, to Southeast district office, Shreveport, La.; **Don H. Flickinger,** field engineer, Pine Island field, Vivian La., to petroleum engineer, Southeast district office, Shreveport; **Charles J. Edelen,** field engineer, Spindletop field, Beaumont, to petroleum engineer, division office, Houston.

James W. Nichols, field engineer, High Island field, High Island, to petroleum engineer, district office, Beaumont; **Carl M. Schwab,** field engineer, Anse La Butte field, Lafayette, to petroleum engineer, division office, Houston; **Jim R. Ramsey,** field engineer, Zenith field, Zenith, Kans., to petroleum engineer, division office, Oklahoma City.

Earl K. Sawdy, employe of Pure Oil Co. since 1934, was recently promoted to district superintendent and has assumed his duties in that capacity in the company's Lubbock and Welch districts.

R. L. Grogan, formerly in charge of products marketing for Dale W. Moore Oil Co., Houston, has resigned to become president of the newly organized Margro Oil Corp. which will deal in tank-car and barge movements of all petroleum products with headquarters in Shreveport.

V. E. Hamilton, Jr., construction superintendent for United Gas Pipe Line Co., for the past 9 years, has been named assistant chief engineer to replace **D. R. Pflug,** who was recently made chief engineer. Hamilton became construction superintendent of United Gas Pipe Line Co. in Houston in 1939. He moved to Shreveport with the company's headquarters in 1940 and retained the same position until his recent promotion. Hamilton joined a predecessor of the United Gas organization in San Antonio more than 25 years ago. He remained with that firm until 1929, when he moved into the United Gas offices in Houston as engineer and inspector.

Brooks Pierce, division geologist in Wichita, Kans., for Shell Oil Co., Inc., has resigned to become a consulting geologist with offices in Wichita.

John P. Dennis, assistant traffic manager for The Texas Co. in Houston for the past 6 years, has been appointed traffic manager to succeed **W. L. Macatee,** who is retiring after 36 years of service with the company.

SHIFTS—

Philip H. Marsh, engineer, Honolulu Oil Corp., San Francisco to Taft, Calif.; **Irwin B. Allen,** foreman, Stanolind Oil & Gas Co., Raton, N. M., to Rangely, Colo.; **H. D. Jordan,** foreman, Continental Oil Co., Jal, N. M., to Denver City, Tex.; **Stanley Gaynor,** superintendent, Stekoll Petroleum Co., Borger to El Dorado, Tex.; **Clifford H. Overly,** superintendent, Stanolind Oil & Gas Co., Conroe, Tex., to Sheridan, Wyo.

Henry W. Hinkle, engineer, Stanolind Oil & Gas Co., Greggton to Levelland, Tex.; **Ralph G. Blynn,** engineer, Stanolind Oil & Gas Co., Houston, Tex., to Tulsa; **Dayton V. Kitley,** engineer, Ohio Oil Co., Iraan, Tex., to Hobbs, N. M.; **John L. Love,** engineer, Gulf Oil Corp., Port Arthur, Tex., to Cincinnati, Ohio; **J. T. Gilliam,** foreman, Amerada Petroleum Corp., Crowley, La., to Cody, Wyo.; **D. M. Liles,** engineer, Stanolind Oil & Gas Co., Jennings to Vivian, La.

Robert H. Barnes, foreman, General Geophysical Co., Haynesville to Coushatta, La.; **Thomas J. Jeffrey,** engineer, Atlantic Refining Co., Magnolia, Ark., to Dallas, Tex.; **O. I. Jantz,** foreman, Amerada Petroleum Corp., Hattiesburg, Miss., to Crowley, La.; **R. B. Cragin,** engineer, Houdry Process Corp., of Pennsylvania, New York City to Philadelphia; **Henry Burrows,** superintendent, Cities Service Oil Co., Ottawa, Kans., to Pampa, Tex.

Lester B. Wood, engineer, Phillips Petroleum Co., Bartlesville, Okla., to Midland, Tex.; **H. J. Stewart,** engineer, Sunray Oil Corp., Oklahoma City to Alice, Tex.; **Oliver J. Todd, Jr.,** geologist, Sabine Development Co., Beaumont to Houston, Tex.; **Vincent L. Crawford,** engineer, Gulf Research & Development Co., Port Arthur, Tex., to Pittsburgh, Pa.; **G. A. Schofield,** foreman, The Texas Co., Grand Junction, Colo., to Lewiston, Mont.; **R. P. Schorman,** engineer, Phillips Petroleum Co., Kansas City, Kans., to Collingswood, N. J.; **Fraser H. Allen,** engineer, Stanolind Oil & Gas Co., Tulsa to Casper, Wyo.

DEATHS

William Clover, 83, pioneer oil operator in Pennsylvania, Ohio, and Indiana, died May 15 in St. Marys, Ohio. In the early days he was associated with Neely-Clover Co., drilling and producing, which at one time operated 60 strings of tools in Ohio and Indiana. He later became associated with Iron Mountain Oil Co.

Charles A. Miller, Jr., manager of the plant department, Shell Oil Co., Inc., New York, died May 10 in West Englewood, N. J. Miller, who joined Shell in 1924, was appointed manager of engineering and maintenance in the marketing department of the company's New York head office in 1940.

G. L. Atkinson, 49, supervisor of Continental Oil Co.'s experimental laboratory, at Ponca City, Okla., died May 10 in Wichita Falls, Tex.

Clarence B. Wenger, 72, retired foreman for Atlantic Oil & Refining Co., died May 13 in Tulsa.

John H. Eisenhart, 68, supervisor for 28 years of the package division of the Bayway refinery of Esso Standard Oil Co., Linden, N. J., died May 9 in Elizabeth, N. J.

Fred L. McDaniels, 66, superintendent of production for Midstates Oil Corp., died May 13 in Tulsa. McDaniels entered the oil business in 1901. His first affiliations were with Ureka Pipe Line Co. and Carter Oil Co. in West Virginia. He moved to the Mid-Continent fields in 1905.

Clarence Jennings Peterson, 63, chief geologist for Texoma Natural Gas Co., died May 8 in Amarillo, Tex. He joined Texoma when it was organized 17 years ago.

Julius S. Stratmeyer, 57, for 25 years treasurer of Pennsylvania Service Oil Co., died May 6 in Reading, Pa.

C. J. Craft, 52, a production superintendent for Quintana Petroleum Corp., Houston, died May 13 in Refugio, Tex.

E. M. Flake, Houston, research engineer for Halliburton Oil Well Cementing Co. for 8 years, died May 9 in Columbus, Ohio.

Highly Technical Oil Industry Made Simple in Expo's Hall of Science

by Charles J. Deegan

"ALL the oil companies should insist that every man at the exposition spend at least an hour in the Hall of Science, so that he will get a picture of what this industry is all about, and what foundation it all rests upon." In one form or another, that comment is heard repeatedly as visitors move slowly down the line of exhibits.

World's Oil Mapped

As the visitor enters the hall, he instinctively turns to the right, and is intrigued by a beautiful display of fossils to put him in the right mood. Next he sees a map of the world which shows the relative amounts of proven and potentially proven oil reserves as now known. Then he sees geological history unfold in seconds, as the growth of the Oklahoma City field structure is shown in a series of pictures, and next is a three-dimensional model to carry the two-dimensional pictures into reality for him. As he looks up, he sees two large maps of the world, showing the broad outlines of the sedimentary basins in which oil exists, or is likely to be found. To bring him back from this world picture, he finds two models of oil fields, each three dimensional — one of Midway, Ark., the other of the first truly offshore Gulf Coast field, Creole, in Louisiana.

If he has been intrigued by all the talk about Continental-Shelf exploration in the Gulf of Mexico, an upward look shows him a huge cross section showing the various formations thickening as they dip off land into the water. Below, a continuous series of pictures shows him the electrical log and fossil characteristics of these formations. Having been introduced to Gulf Coast conditions, he is ready for the exhibit that will show him in minutes how salt domes are formed—a replica of a salt dome actually growing before his eyes.

Then he moves into the instrument phases. Aerial photography is illustrated; scale models in a glass tank of water demonstrate how an overwater seismograph crew operates; an exhibit demonstrates the extreme sensitivity of the seismic geophones; instruments are there for him to see how samples look under ultraviolet light. By this time, the airborne magnetometer seems a perfectly logical thing, and there it is, in working model flying over a cutaway model of the earth.

Now he moves into a series of exhibits where the geophysicist shows him just exactly what properties of the earth each instrument measures, and in models that mark a new high in nontechnical explanation of scientific principles. The sound waves of the seismograph are demonstrated, as are their measurements; he sees just what makes the gravity meter work and why; the differences in magnetic properties of various rocks and how they are detected becomes apparent; and the same applies with even more force to the demonstration of the radioactivity properties of rocks.

The problems of the geophysicist in surveying and what he is doing about them are demonstrated, as are some of the expedients he uses to get his instruments to the place he wants to get. After airplanes, a diving bell seems quite logical for men such as these to use; and, of course, people who go in for things like this naturally find use for radar.

Now he moves into what seems like more familiar territory, drilling mud, only to find that mud isn't just mud any more. The chemists and engineers show him a bewilderingly complex exhibit of chemicals that they add, one for this purpose, one for that purpose, another for something else.

Cementing, Perforating Shown

By this time, he takes it quite calmly when he finds that the gamma rays and neutrons he has been hearing about in connection with atomic energy are also used to log the formations in wells, and a working model shows just how it is done and what the resulting log looks like.

But it is something of a relief to run into a series of mechanical devices that, ingenious though they are, don't seem to have delved so far into the upper realms of science for their working principles. The how and why of gun perforating the casing in a well, after cementing the casing in place, are shown in models that even a child can understand; the how and why of cementing become equally

Fig. 1—Geophysical exhibit demonstrating in center case, measurements of gravity, magnetic, and radioactive properties of various kinds of rocks. Flanking cases are working models simulating gravity recordings in passing over a salt dome. Front foreground is surface magnetometer; pictures on wall show helicopter used in gravity survey in Louisiana. *(See The Oil and Gas Journal, June 7, 1947, page 81)*

clear, and a caliper logging device is self-explanatory.

The electrochemical method of locating water leaks is a little more difficult to understand than some, but not too much. But when it comes to clear and simple explanations of mechanical processes affecting underground conditions the cutaway working model and synchronized voice explanation of selective acidization of lime pays is hard to beat. Having reached the end of the line, the visitor turns, only to be confronted with an exhibit showing what a laboratory does with cores, and beside it one showing how water flooding is planned and made to work.

Back down the center aisle is a working, scale model (1 to 10) of a rotary rig in operation, 15½ ft. high from base of substructure, with mud pits, pumps, and everything working. It was built and is operated by students of the drilling-process course at Kilgore, Tex., Junior College, and will be used in classes at the college after the exposition.

A full course in the uses and practical aspects of helium-shielded arc welding offers an education. Then the visitor's eye is caught by the skyhook model, an overhead-cable tramway for handling material either in rugged terrain, or from land to offshore ships in places that lack dock and harbor facilities, or where shallow water prevents ships from approaching shore.

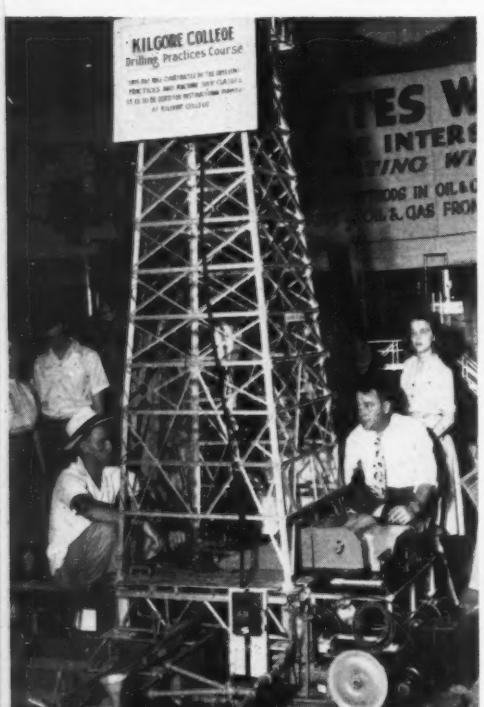


Fig. 2—Scale working model of rotary drilling rig (scale 1 to 10), built and used by Kilgore Junior College in drilling courses sponsored by American Association of Oilwell Drilling Contractors

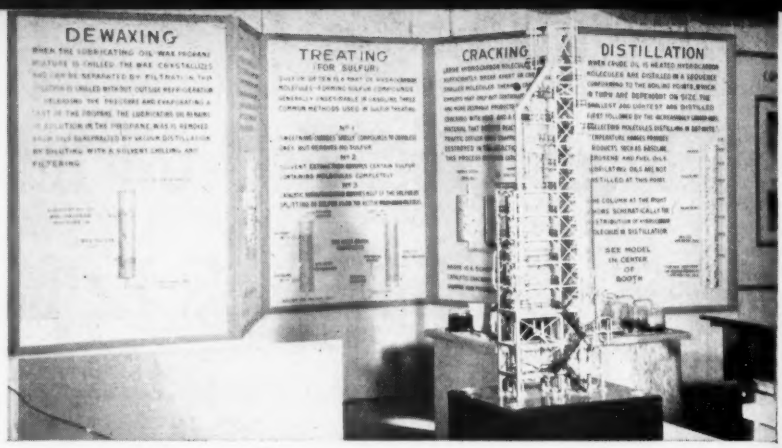


Fig. 3—Part of refining exhibit. Panels in background give brief description and diagrams below description illustrate the principal elements of refining processing. Foreground is a model of a catalytic cracking unit

About this time the visitor suddenly discovers that he overlooked a long table with cores from oil pay zones in fields all over the United States — Gulf Coast cores, Rocky Mountain cores, Mid-Continent cores, cores from everywhere; from fields whose names are familiar to all oil men. These were a real eye opener to visitors who had never seen a core before or been around fields in the drilling stage. They seemed amazed that oil was recovered from rocks like these.

Most visitors now turn to the other side of the entrance and go back down the east wall. First they are introduced to chemicals from petroleum and a myriad of uses they had never dreamed of. Solvents for extracting oil from cotton seed and soy beans seem to interest many, perhaps because cotton and cotton seed were familiar to southwesterners. Then comes the transportation exhibit, most of which seems familiar to the visitors as individual items, but the grouping together of all forms used seem to give them an entirely new impression of the size, variety, and scope of petroleum-transportation facilities. Models of barges, towboats for rivers, and diesel locomotives; photographs of tankers and of pipelaying scenes; a complete layout of natural-gas transportation; trainloads of tank cars; loading of transport trucks—all put together give an entirely different picture of petroleum transportation to most visitors. The model of the Natalie O. Warren, the world's first ship specially designed to handle products lighter than gasoline, attracts much attention.

Refinery Processes Shown

Suddenly the visitor discovers that he is in the midst of a series of exhibits that tell him all about the chemical and refining methods by which the industry process crude oil into a myriad of products—some familiar, some scarcely known to the average individual.

He finds gas analyzers, glass fractionating coils, and diagrams showing: how gasoline and other products are made from either natural gas or coal; how synthetic butyl rubber is made for inner tubes and other types for casings; and how antiknock additives are handled at a blending plant. He sees also a conventional bubble tower, a demonstration of furfural extraction, models of two types of catalytic cracking units, and an explanation of the catalytic process of desulfurization.

Then his eye is caught by a beautiful exhibit of glass panels, lighted from behind. In these are crude oils from familiar fields from all parts of the world. Bubbles of air move up through the crudes, and nature's wide variations in making crude oil become evident to the eye. Turning to the left, he discovers a series of panels describing the various processes through which crude passes in refining, and what happens. About half way down each panel, an ordinary looking can, about quart size, sticks part way through the panel. Instead of the conventional paper label, the paper is covered with what seems to be a geometric design of some kind. Closer check and comparison with a legend on the panel suddenly reveals that the various designs represent the different types of hydrocarbon compounds, and that moving from panel to panel, the designs change in size and distribution. Moving from panel to panel, the visitor finds the whole purpose of each major part of the refining processes explained and illustrated.

By this time, the visitor's feet begin to protest, and he is delighted to find that a few steps will take him into a theatre where he can sit and study for hours, if he wishes, educational film after film, explaining in dramatized detail, practically every phase of this marvelous industry. He certainly agrees that Hall of Science is just that, and wonders if there is any branch of science, or kind of scientist, that the industry does not use.

Oil Clans Gathered at I. P. E.

Seen at right are some of the personnel of Barnsdall Oil Co. (Kneeling) K. Lindley, district engineer, Jennings, La.; W. L. Horner, chief engineer, Tulsa; J. Peery, district engineer, Victoria, Tex.; and M. D. Olive, field engineer, West Tepetate, Elton, La. (Standing) W. F. Latting, manager, personnel department, Tulsa; L. B. Jeffers, district engineer, Tulsa; L. Whittaker, drilling superintendent, Cody, Wyo.; J. H. Douma, production superintendent, Tulsa; A. E. Hoffman, district production superintendent, Jennings, La.; T. Cline, drilling superintendent, Shreveport; G. Noland, manager, drilling department, Tulsa; J. Morgan, tool pusher, Cody, Wyo.; H. W. Manley, manager, production department, Tulsa; E. J. Mills, project superintendent, Benton, La.; A. P. Higgenheiser, tool pusher, Shreveport; E. S. Lougee, assistant to chief engineer, Tulsa; R. B. Chesney, assistant project superintendent, Benton, La.; H. E. Hadden, district production clerk, Patmos, Ark.; and G. Weathersby, tool pusher, Victoria, Tex.

While delegates of foreign governments and oil men from abroad added glamor to the oil show, by far the bulk of the attendance was made up of domestic oil men. A few representative groups of company officials are pictured here as they gathered informally on the exposition grounds.

Among Stanolind Oil & Gas Co. personnel at the exposition were those seen in the second photo from top: W. R. Warren, Ellinwood, Kans.; J. W. Caldwell, Zenith, Kans.; Don Crall, Wewoka, Okla.; George Fort, Shreveport; and W. C. Pearson, Ellinwood, Kans.

Group from Amerada Petroleum Corp. with The Oil and Gas Journal's plat of I.P.E. exhibits: J. O. Hathaway, district superintendent, West Texas district, Midland; H. B. Hite, district superintendent, Duncan district, Duncan, Okla.; J. E. Low, division superintendent, Fort Worth; W. G. Ricketts, general superintendent, Tulsa; O. C. Arnold, division superintendent, Tulsa; C. H. Danchertsen, district engineer, West Texas district, Midland; W. H. Dunlap, assistant district superintendent, Seminole district, Seminole, Tex.; J. R. Marty, district engineer, Duncan district, Duncan, Okla.; C. V. Millikan, chief engineer, Tulsa; and B. J. Sinex, district engineer, South Texas district, Fairbanks

Shell Oil Co., Inc., group: R. M. Asbury, Perry, Okla.; R. M. Trapp, Tulsa; A. K. Duncan, Wichita Falls, Tex.; L. E. Slagle, Midland, Tex.; Fred N. Robinson, Tulsa; B. W. Steincamp, Bristow, Okla.; L. H. Humphrey, Tulsa; A. C. Dahl, Midland; E. L. Shields, Wichita Falls; Don Obermeir, Wichita Falls; W. H. Burke, Tulsa; and E. A. Milz, Oklahoma City

VENEZUELA: *Delegation being greeted at Tulsa airport. Shown are Eduardo Acosta, staff engineer; Luis Lopez Conde, staff engineer; Dr. Oscar B. Irizarry, Petroleo Interamericano; Amos Pifano, staff engineer; Bradley Murray, economic adviser; Gustavo Thery Fombora, assistant chief of Petroleum Bureau; Jose Martorano Battisti, chief of Petroleum Bureau; P. C. Lauinger, colonel on Governor Turner's staff; Gaston Pernalete, staff engineer; Mark Gilbert, president of Tulsa Nomads; Abel Monsalve, government inspector in Maturin area; Luis Elias Corrales, staff engineer and member of University of Caracas Engineering School*

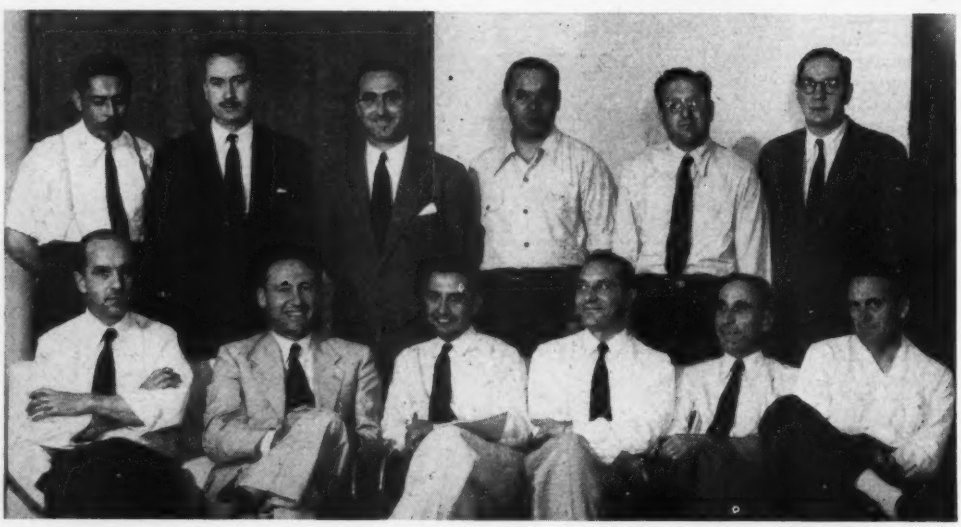
Latin-American Visitors Throng Exposition

PICTURED on these two pages are a few of the official delegates from Latin-American governments in attendance at the opening of the International Petroleum Exposition.

Official greeters of these foreign government groups were P. C. Lauinger, publisher of The Oil and Gas Journal and a colonel on the staff of Gov. Roy J. Turner of Oklahoma, as well as a director of the I.P.E.; and Dr. Oscar B. Irizarry, editor of Petroleo Interamericano, and special representative of the exposition.

URUGUAY: *Dr. Carlos R. Vegh Garzon, Montevideo, president of the South American Petroleum Institute, being greeted by Dr. Irizarry*

ARGENTINA: *Front row: Jesus Inigo, Argentine superintendent for Drilling & Exploration Co.; I. J. Teitelbaum, petroleum engineer in charge of the Dallas office of Yacimientos Petroliferos Fiscales; Carlos Martinez Eder, field superintendent, Salta field; Adolfo Pacagnini, general superintendent of exploitation; Alberto Landoni, director of exploitation and Y.P.F. board member; and Eugenio Dalton, field superintendent, Plaza Huincul. Back row: Blas Berardinelli, chief gas engineer, production department; Esteban Ospital, maintenance superintendent; Aldo Rolla, chief engineer, Mendoza field; David A. Revelli, M. Giordano, and Enrique Gastaldi, chief of production technology*



BRAZIL: *O. B. Irizarry; A. S. Moggi, staff assistant to president of National Petroleum Council of Brazil; Pedro de Moura, manager of Bahia Oil Fields; Gen. Joao C. Barreto, president of the National Petroleum Council of Brazil and head of the delegation; L. M. de Mello, first assistant to the president of the National Petroleum Council of Brazil; C. E. Paes Barreto, United States representative of the National Petroleum Council of Brazil*

PERU: *Carlos Alzamora, Minister Plenipotentiary and Commercial Counselor, Peruvian Embassy, Washington, D. C.; P. C. Lauinger; Jorge A. Broggi, chief of the Geological Institute of Peru*

CHILE: *Estanislao Fabres, engineer assigned to New York office of Corporacion de Fomento; Eduardo Simian, engineer in charge of field operations in Magallanes; Luciano Claude, chief of fuels department of Corporacion de Fomento, chairman of the delegation; Dr. Irizarry; Fernandos Salas, New York office of Corporacion de Fomento*

MORE than 200 foreign citizens representing both governments and oil companies in 30 countries registered at the exposition during the first 3 days, and more were due to arrive later in the week, making this the most international exposition ever held.

Countries represented included Algeria, Argentina, Bolivia, Brazil, British West Indies, Canada, Chile, China, Colombia, Cuba, Ecuador, Egypt, England, France, French Morocco, Holland, India, Iran, Mexico, Netherlands East Indies, Palestine, Paraguay, Peru, Saudi Arabia, Turkey, Uruguay, U.S.S.R., and Venezuela.

In addition there was another group, almost as large, of American citizens engaged in foreign operations for United States oil and equipment companies, brought in by their companies to study the new equipment and techniques displayed at the oil show.

At the left is "International House" maintained on the exposition grounds by the Nomads. Here foreign delegates and oil and equipment men operating abroad registered and made their headquarters and were furnished with interpreters and guides

Representatives of the Royal Dutch-Shell companies were present from all parts of the world. Shown here are: E. J. Douze, field manager, Diadema, Argentina, S.A., Buenos Aires; A. J. de Jager, equipment engineer, B.P.M. Batavia, N.E.I.; L. J. Van Dijk, Asiatic Petroleum Co., New York City; J. C. Steketee, Shell de Colombia, Bogota

Companies Bring Men to I. P. E. From Abroad

OIL companies with foreign operations brought large groups of their men from all parts of the world to attend the International Petroleum Exposition.

Pictured on this page are a few of the early arrivals from distant areas. In addition to the display of new equipment, the I.P.E. served as a central point for company conferences and for renewing acquaintances among the far-flung oil fraternity.

Left: H. C. Gulledge, Standard Oil Co. of Egypt

Right: S. L. Slaughter, International Petroleum Co., Ltd.

Creole Petroleum Corp. group: R. G. McWhorter, W. Yates Brown, M. L. Muller, and E. D. Ackerman

Oil Show Unveils Scientific Progress

(Continued from page 115)

ment has no intention of spending $9,000,000,000 in developing a synthetic-fuels industry.

That figure, he explained, was a technical report on what it would cost to build plants with a capacity of 2,000,000 bbl. daily.

"I want it done by private industry," he declared. "I think it would be done better by private industry and at tremendous saving to taxpayer. Any oil man who feels that his Government is about to compete with him in synthetic fuels is welcome in my office to discuss taking over the development of commercial-scale plants. If no oil or other interests are willing to undertake the job, then it will be up to Congress to determine the extent to which the Government should go in assisting in the program."

Wants Tidelands Settled

In his speech Krug avoided discussion of the controversy over state or federal ownership of offshore lands, now pending in Congress, except to say that whatever the outcome the marginal sea promises to be an important source of oil for the future. But in a press conference later he said he hoped Congress will decide the issue soon so that industry can proceed with development plans, and if federal ownership is sustained there will be no government restrictions preventing such development.

Discussing the world outlook for petroleum, Krug predicted that other countries in the Western Hemisphere will increase their production rapidly, that the East Indies fields will be back in full operation before long, and that European needs will largely be met by oil from the Middle East.

The formal opening was signaled by William R. Boyd, Jr., president of the American Petroleum Institute, who recounted the industry's progress and present problems.

"If it were possible for the exposition to be a must for every American, some of the misapprehensions that concern our industry would evaporate," he said. "Here the tremendous and real competition, the eagerness for advancement, the zeal for what's around the corner in the oil business are readily apparent and easily understandable."

With a salute to I.P.E. President Skelly, Boyd signaled the unfurling of a huge American flag between two towering oil derricks, while the band played the national anthem.

Then horns and whistles sounded throughout the grounds, motors began to throb and pump jacks to bob, and the International Petroleum Exposition was open.

I. P. E. — 1923 — 1948

Entrance to the first International Petroleum Exposition, Tulsa, 1923, held in improvised display booths on a roped-off street

THERE were oil shows of a sort before Tulsa was born but the idea of a permanent, annual, International Petroleum Exposition and Congress originated in Tulsa a quarter-century ago as a civic enterprise and has been carried on ever since save for interruptions necessitated by a world-wide depression and a world-wide war.

Today's Silver Anniversary Exposition lacks the carnival atmosphere of some of its predecessors but it conforms to the pattern envisioned by the founders in 1923 as a meeting place for oil men from all parts of the world for the exchange of ideas and the serious discussion of current problems.

The exposition idea was conceived from a small display of oil equipment gathered by the Tulsa Purchasing Agents Association in 1922. Several local citizens soon began to propose that such a display be held annually. James McIntyre, then editor of The Oil and Gas Journal, and his brother, Edward F. McIntyre, who was experienced in industrial show promotion, presented the plan to the Chamber of Commerce. The latter McIntyre became the first general manager.

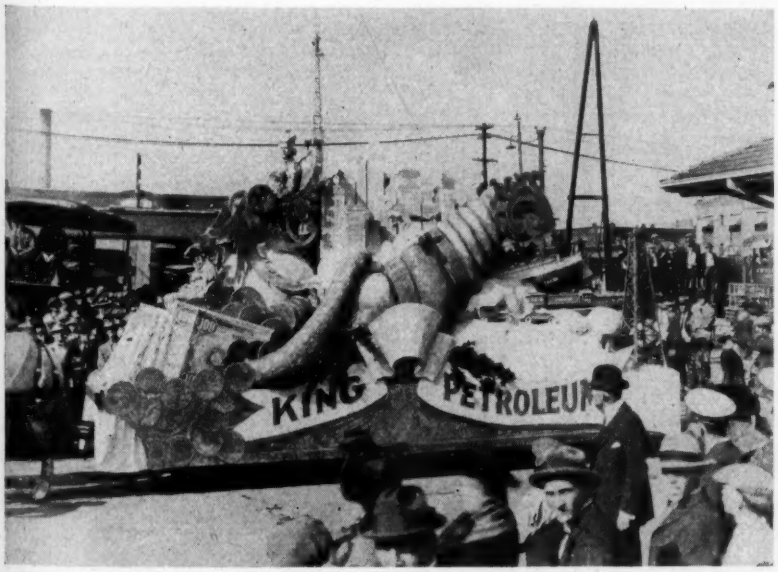
The idea was taken up by the press and civic groups, and a mass meeting early in 1923 resolved to launch the exposition that fall.

The first International Petroleum Exposition and Congress opened October 8, 1923, in improvised buildings on a roped-off street in downtown Tulsa. There were 27 exhibitors and a paid attendance of 14,203.

The early expositions were conducted in a Madri Gras spirit, with parades, beauty contests, a grand ball, and the crowning of a queen. The first one was presided over by a costumed "King Petroleum" and "Queen Petrolia."

For the second exposition, October 2 to 11, 1924, a larger site was taken and there were 86 exhibitors and 27,424 in attendance. The carnival air still prevailed, with shows afternoon and evening and scores of concessions on the grounds.

After the 1925 exposition, W. G.



A carnival atmosphere was combined with the early petroleum expositions. This photo shows "King Petroleum" arriving at the exposition grounds—in a horse-drawn float—to open the 1923 show

THE products of more than 1,800 manufacturers are on display at this 1948 International Petroleum Exposition by 556 contract exhibitors and some 1,300 associate exhibitors and sublessees. Attendance is expected to approximate 225,000 before the gates close. Similar data for previous Expositions are shown in the following table:

Year	Exhibitors	Paid attendance
1923	27	14,203
1924	86	27,424
1925	102	28,512
1927	189	67,832
1928	258	89,316
1929	289	100,314
1930	312	112,605
1934	326	121,398
1936	397	152,011
1938	576	226,427
1940	628	194,491

OFFICERS AND DIRECTORS OF THE FIRST EXPOSITION—1923

Skelly, president of Skelly Oil Co., was made president of I.P.E., which position he still holds. That same year the present 15-acre exposition site was leased from the Tulsa State Fair, and plans began for the erection of permanent buildings.

With the 1927 exposition all amusement and carnival features were discarded and emphasis was put on the educational displays of the Hall of Science. President Calvin Coolidge opened the show by pressing a button in the White House which released compressed air and caused crude oil to spout from the replica of the Drake Well. That year also saw the start of the ceremonies for "Grand Old Men" of the oil industry, with John D. Rockefeller, Sr., presenting Old Timer awards to the pioneers.

The 1928 show was marked by the large number of delegates from abroad and by the great interest in displays of rotary-drilling equipment, then quite new to the industry. The depression was well under way when the 1930 exposition was held, but it was successful and abounded with optimism for the future. Nevertheless it was 4 years before another exposition was held.

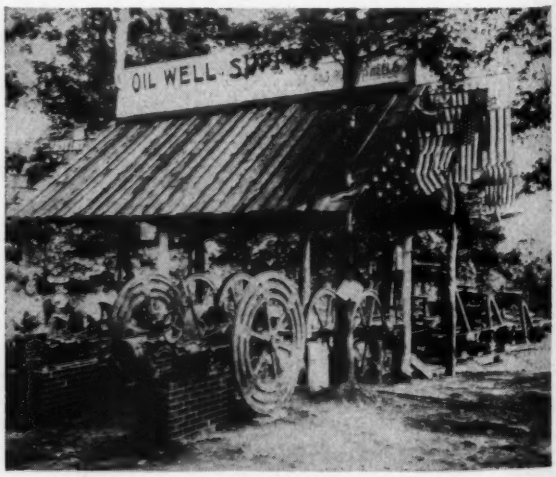
The revival in 1934, when the date was shifted to the spring, came at the height of the National Recovery Administration, with the oil industry operating under a federal code. Harold L. Ickes, Secretary of the Interior and head of the Petroleum Administrative Board, opened the exposition with an important address.

The exposition was made a biennial affair then, and succeeding shows grew rapidly in number of exhibitors, value of equipment displayed, educational features in the Hall of Science, and volume of attendance.

The 1940 exposition, the last prior to this, came in the midst of war in Europe, but was attended by an unusually large number of foreign visitors eager to learn ways of increasing their oil production. There was special interest in oil-industry use of such scientific developments as gamma rays, radio, and geophysical prospecting, soon to be hidden by a curtain of wartime secrecy.

Not until the war had been over for more than 2 years was it felt advisable to resume the International Petroleum Exposition. Announcement that there would be a 1948 show was made to the industry last fall, and since then the grounds and buildings have been undergoing thorough reconditioning and more exhibit space was crowded into the 15 acres to accommodate the scores of newcomers with something of interest and importance to show to the oil industry of the world.

It was clearly evident that this would be the "biggest and best" oil show of them all, and even before it opened there were urgings that it be made even bigger and better in the future. It has been suggested that the International Petroleum Exposition and Congress return to an annual basis, that the grounds be enlarged, that it be kept open 2 weeks or more, and even that it be made a permanent, year-around affair.



What is said to have been the first oil show ever held anywhere was in Oil City, Pa., in 1898. This old photo shows the steam engines and eccentric pumping powers which were the newest thing on display at that exposition

Exploration, Drilling Exceeding Schedules— Daily Completions 11 Ahead of 1947

by Charles J. Deegan

THE exploration and drilling branches of the industry thus far in 1948 are running just about on the schedule that the operators laid out last December. When the operators' forecast of their program was reported in The Oil and Gas Journal, (January 29, 1948, page 153), there was skepticism in some quarters, particularly among a certain type of would-be government controllers, that such a program could possibly be achieved under free competitive enterprise conditions. Comments were made to the effect that this program represented what the industry would like to do, not what it expected to do.

Where the actions of thousands of individual operators and companies are involved, the statistical record piled up after a certain amount of time has elapsed is the only method of testing such a difference of opinion. Refinery, natural gasoline-cycling, and pipe-line construction projects are relatively few in number and construction progress can be watched. Wildcat and development wells, scattered all over the United States, can only be counted.

After 17 weeks, nearly one-third of the year, it is obvious that the operators knew what they were doing and the skeptics just didn't understand what oil men can do when they buckle down to business. The operators forecast an exploration program of 6,300 wildcat wells, an all-time high record of course. At the 17-week mark, they are running at an annual rate of 6,500 wildcat completions, slightly ahead of schedule.

For development drilling, the operators laid out a schedule of 30,300 wells for 1948. At the end of the 17 weeks, development-well completions are running at an annual rate of 31,000, likewise slightly ahead of schedule.

Of all the goals established by the operators, the drilling footage mark of 131,700,000 ft. was criticized the most, as being utterly impossible. At the end of 17 weeks, the skeptics may find what consolation they can in this figure. Here the operators are a shade behind schedule; they are running at an annual rate of only 98.4 per cent of the program. The annual rate based on results of this period would be only 129,600,000 ft., instead of 131,700,000. However, this figure is based on completed wells. Many of the deep wells started in 1948 have not been completed within this period, and their footage marks may yet change the annual total picture.

Since complaints of shortage of pipe are almost universal, it is evident that operators are not drilling all the wells they would like to. What they are doing is what they anticipated they would be able to with the steel they figured they would be able to procure. If they could get more pipe, they would set still higher records. The results of almost one-third of the year indicates their collective judgment was good in the matter of how much steel they could obtain and what they could do with it.

Geological Activity

Since wildcat drilling is breaking all previous records, it is not surprising to find that the exploratory activity that precedes the drilling of the wildcats is also at an all-time

Typical aerial photograph from which geologist can gain many clues to regional geology

HORTON DOUBLE—D

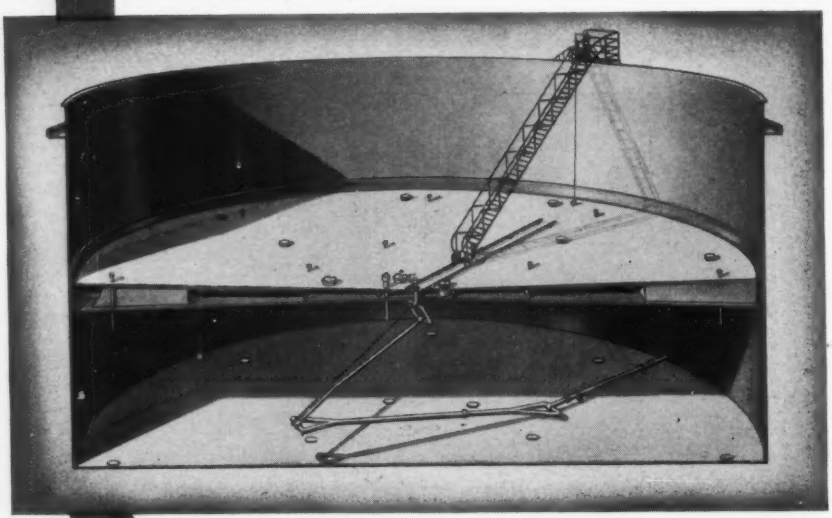
PROVIDE PROVEN PROTECTION from evaporation loss, fire hazard and corrosion . . . . . .

When you install a Horton Double-Deck Floating Roof on an oil storage tank you *know* you are getting the kind of protection that is required for maximum efficiency in your operations. Average figures showing how evaporation losses from a fixed-roof storage tank compare with the losses from a Horton Double-Deck Floating Roof tank (under certain given conditions) are shown in the tables on the opposite page. They're proof of the efficiency of the Horton Double-Deck Floating Roof.

You can use this floating roof advantageously at pipe line stations, tank farms, bulk stations, natural gasoline plants and refineries. It will pay for itself in a relatively short time by the amount of evaporation losses it prevents.

The fundamental design of the Horton Double-Deck Floating Roof is based on years of experience in building all types of evaporation-prevention equipment. The dead air space between the decks provides insulation which limits the rate of heat transfer from atmosphere to liquid and prevents or reduces boiling losses. The bottom deck floats directly on the liquid. This eliminates the vapor space in the tank and does away with any expansion and venting of vapor with resultant breathing losses. Since the roof rides up and down on the liquid, filling losses are eliminated. The absence of vapor space in the tank reduces fire hazard. And, since no air comes in contact with the bottom of the bottom deck, corrosion is reduced to a minimum.

Why not use the floating roof that gives you *proven protection?*—The Horton Double-Deck Floating Roof. Get quotations or full details from our nearest office.



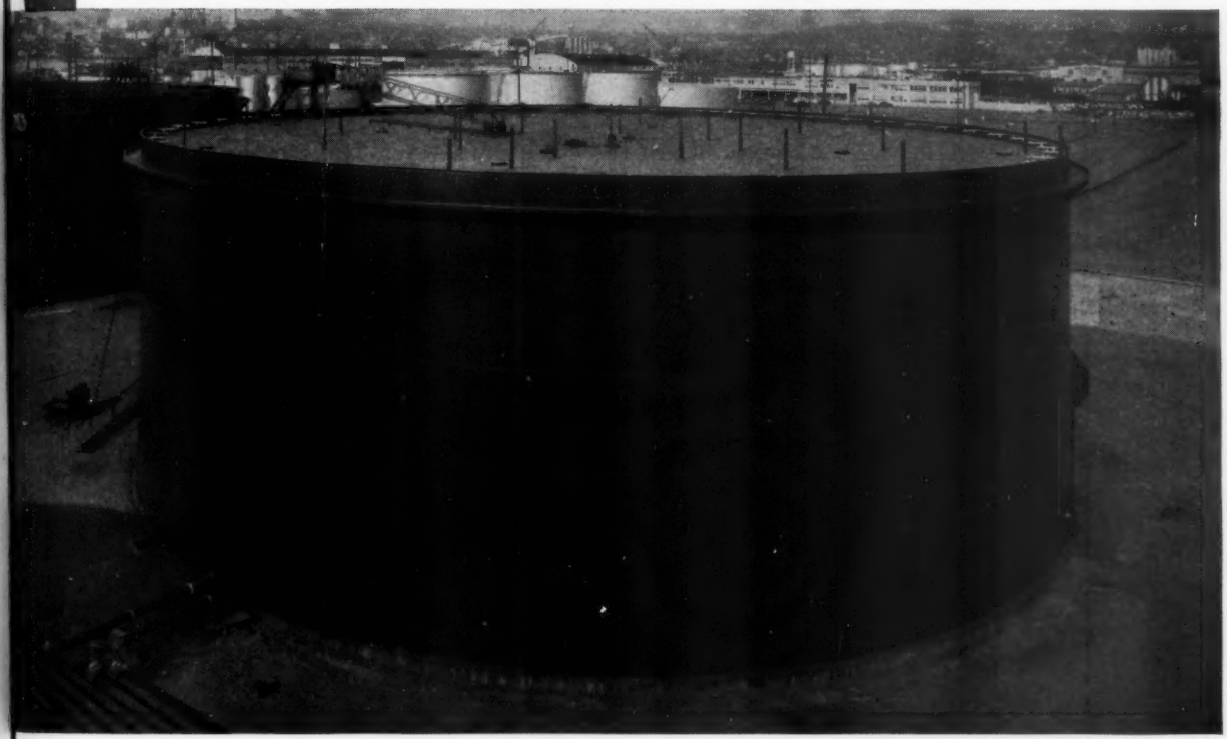
● *Left: Cutaway view of the Horton Double-Deck Floating Roof. Note the double-deck construction. The roof is divided into a number of compartments by bulkheads. The buoyancy of approximately 25 percent of the compartments will support the entire roof. The top deck is sloped toward the center which assures positive drainage. The 80,000-bbl. tank on the opposite page has a Horton Double-Deck Floating Roof. It is 120 ft. in diam. and 40 ft. high.*

CHICAGO BRIDGE

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Chicago, 4	2128 McCormick Bldg.	Atlanta, 3	2154 Healey Bldg.	Philadelphia, 3	1615-1700 Walnut Street Bldg.
New York, 6	3347-165 Broadway Bldg.	Birmingham, 1	1536 North 50th St.	Havana	402 Abreu Bldg.
Cleveland, 15	2204 Guildhall Bldg.	Tulsa, 3	1606 Hunt Bldg.	San Francisco, 11	1254-22 Battery Street Bldg.
Los Angeles, 14	1423 Wm. Fox Bldg.	Houston, 2	2119 National Standard Bldg.	Detroit, 26	1514 Lafayette Bldg.

DECK FLOATING ROOFS!



IF YOU ARE HANDLING CRUDE OIL, COMPARE THESE EVAPORATION LOSS FIGURES

TANK SIZE	GASTIGHT CONE ROOF		HORTON FLOATING ROOF	
	Annual Breathing	One Filling	Annual Breathing	One Filling
10,000	150 bbls.	8 bbls.	32 bbls.	0
40,000	480 bbls.	32 bbls.	64 bbls.	0
80,000	848 bbls.	64 bbls.	88 bbls.	0

The losses shown in the table above are based on a Mid-Continent Crude

PLUS ADDITIONAL SAVINGS RESULTING FROM SMALLER DROP IN API GRAVITY

IF YOU ARE HANDLING MOTOR GASOLINE, COMPARE THESE EVAPORATION LOSS FIGURES

TANK SIZE	GASTIGHT CONE ROOF		HORTON FLOATING ROOF	
	Annual Breathing	One Filling	Annual Breathing	One Filling
10,000	300 bbls.	15 bbls.	64 bbls.	0
40,000	960 bbls.	60 bbls.	128 bbls.	0
80,000	1700 bbls.	120 bbls.	180 bbls.	0

The losses shown in the table above are based on a 10-lb. Reid vapor

PLUS ADDITIONAL SAVING RESULTING FROM SMALLER DROP IN VOLATILITY AND OCTANE RATING

& IRON COMPANY

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Compania Tecnica Industrie Petroli, S.A.I., Rome, Italy
Leopoldo Sol & Cia., Reconquista 558, Buenos Aires, Argentina
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Chicago Bridge & Iron Company, Limited, Apartado 1348, Caracas, Venezuela

peak. New membership records are being established by both the American Association of Petroleum Geologists and the Society of Exploration Geophysicists. Naturally then it is not surprising that the joint annual meeting of exploration scientists just recently concluded in Denver, also established a new attendance record.

The offshore exploratory activity along the Gulf Coast gets a lot of publicity because of the spectacular nature of the operations. Its long-range importance is not minimized by any informed exploration scientist. But neither is that same scientist minimizing the future possibilities of the Gulf Coastal Plain area from the Mississippi Delta eastward to the tip of Florida. A lot of oil has been produced, and a lot more remains to be found between Brownsville and the Mississippi Delta. The same coastal plain extends around to Florida, and even though there are a lot of geological differences, the area is receiving plenty of exploration work.

The West Texas-Southeastern New Mexico area is receiving attention based on the firm ground that exploration work there will pay dividends for years to come, and that the present large production is from a comparatively early stage of development, particularly in the pre-Permian formations.

The Anadarko basin of Oklahoma has hardly been scratched. The four-corner area of Arizona-New Mexico-Utah-Colorado is the scene of plenty of exploration activity, mostly considered in the pioneering stage. The Uinta basin of northwestern Colorado-northeastern Utah has been stimulated by developments at Rangely. Inner-basin exploration all over Wyoming is yielding promising results, and that opens up an enormous area for many years of work. The Canadian trough, as the result of developments at Leduc-Woodbend, looks like a region due for exploration and development for a quarter century or longer. If the modernized technique of refraction seismograph works in the overthrust area along the front of the Rockies everywhere as well as it did in the Gulf Oil Corp. Pincher Creek strike in southern Canada, an area several hundred miles long will receive a play in hopes of finding more Turner Valley fields.

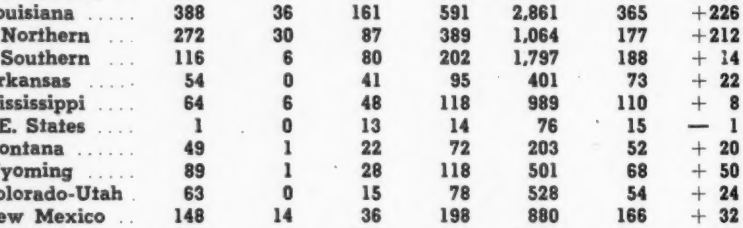
The exploration men have only one new tool in even moderate use, the airborne magnetometer, and that is not yet responsible for any of 1948's oil production. The exploration tools that bit by bit, a piece here and a piece there, have enabled production to be increased about 600,000 bbl. daily in the past year, are the improved versions of the old familiar ones. The oldest, surface geology, then subsurface geology, and the geophysical tools, mainly the gravity meter and the seismograph, are still the mainstays of the exploration scientists.

The use of aerial photography has increased steadily and quietly. It enables the surface geologist to study a broad regional pattern as a unit.

(Continued on page 155)

ELEVEN WELL COMPLETIONS PER DAY MORE THIS YEAR
(BASIS FIRST 17 WEEKS)

	First 17 weeks in 1948					Completions same period 1947	Increase 1948 over 1947
	Oil	Gas	Dry	Total comp.	Footage drilled (1,000's)		
New York	245	0	249	494	527	414	+ 80
Pennsylvania	402	67	416	885	1,622	968	— 83
West Virginia	29	152	48	229	586	256	— 27
Ohio	111	130	144	385	1,083	390	— 5
Indiana	147	19	119	285	502	176	+109
Kentucky	63	28	100	191	320	155	+ 36
Illinois	318	1	260	579	1,488	603	— 24
Michigan	77	10	109	196	461	177	+ 19
Kansas	420	84	288	792	2,598	794	— 2
Neb., Mo., Iowa	....	0	....	....	....	2	— 2
Oklahoma	666	64	428	1,158	3,962	1,272	—114
Texas	2,072	159	1,109	3,340	14,631	2,650	+690
N. Central	516	16	471	1,003	3,026	831	+172
West	765	8	132	905	4,192	624	+281
Panhandle	117	52	16	185	565	136	+ 49
Eastern	89	21	63	173	979	155	+ 18
Gulf Coast	291	29	203	523	3,305	503	+ 20
Southwest	294	33	224	551	2,564	401	+150
Louisiana	388	36	161	591	2,861	365	+226
Northern	272	30	87	389	1,064	177	+212
Southern	116	6	80	202	1,797	188	+ 14
Arkansas	54	0	41	95	401	73	+ 22
Mississippi	64	6	48	118	989	110	+ 8
S.E. States	1	0	13	14	76	15	— 1
Montana	49	1	22	72	203	52	+ 20
Wyoming	89	1	28	118	501	68	+ 50
Colorado-Utah	63	0	15	78	528	54	+ 24
New Mexico	148	14	36	198	880	166	+ 32
California	745	8	111	864	3,102	621	+243
Total U. S.	6,151	780	3,751	10,682	37,321	9,381	+1,301
Well comp.—Dly. avg.	51.7	6.5	31.5	89.7	313.6	78.8	+10.9



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(Thousands of feet)

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Oklahoma-Kansas	6,490	6,560	+ 70	+ 1.1
North Louisiana-Arkansas	1,013	1,465	+ 452	+44.6
South Louisiana-Mississippi-S.E. States	2,706	2,862	+ 156	+ 5.8
Texas-New Mexico	12,806	15,511	+2,705	+21.1
Rocky Mountain	751	1,232	+ 481	+64.0
California	2,480	3,102	+ 622	+25.1
Total United States	32,824	37,321	+4,497	+13 7

TABLE 3—TOTAL WELL COMPLETIONS BY AREAS FIRST 17 WEEKS 1948 VERSUS FIRST 17 WEEKS 1947

	First 17 weeks		Well changes	Per cent changes
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Appalachian (incl. Ohio)	2,028	1,993	— 35	— 1.7
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Texas-New Mexico	2,816	3,538	+ 722	+25.6
Rocky Mountain	174	268	+ 94	+54.0
California	621	864	+ 243	+39.1
Total United States	9,381	10,682	+1,301	+13.9

TABLE 4—WILDCAT WELL COMPLETIONS BY AREAS FIRST 17 WEEKS 1948 VERSUS FIRST 17 WEEKS 1947

	First 17 weeks		Well changer	Per cent changes
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Appalachian (incl. Ohio)	25	77	+ 52	+208.0
Ill.-Ind.-Mich.-Ky.	203	222	+ 19	+ 9.4
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North Louisiana-Arkansas	41	60	+ 19	+ 46.3
South Louisiana-Mississippi-S.E. States	80	88	+ 8	+ 10.0
Texas-New Mexico	549	750	+201	+ 36.6
Rocky Mountain	37	44	+ 7	+ 18.9
California	108	97	— 11	— 10.2
Total United States	1,411	1,684	+273	+ 19.3

TABLE 5—DEVELOPMENT WELL COMPLETIONS BY AREAS FIRST 17 WEEKS 1948 VERSUS FIRST 17 WEEKS 1947

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	1947	1948		
Appalachian (incl. Ohio)	2,003	1,916	— 87	— 4.3
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Oklahoma-Kansas	1,700	1,604	— 96	— 5.6
North Louisiana-Arkansas	209	424	+ 215	+103.0
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Texas-New Mexico	2,267	2,788	+ 521	+ 23.0
Rocky Mountain	137	224	+ 87	+ 63.5
California	513	767	+ 254	+ 49.5
Total United States	7,970	8,998	+1,028	+ 12.9

Seemingly at the opposite pole, but actually still a part of the regional study, are the sedimentologists and research men examining rocks for sand composition and clay-mineral content. Checking a sample of rock for sand grain-size distribution patterns; working on clay-mineral content by X-ray diffraction, differential thermal analyzers, or chemical techniques; studying thin sections under a microscope; all seem to be dealing with the minute detail but the purpose fits into the regional study.

So, we have the modern surface geological studies bringing into play a whole host of new instruments and improved versions of old instruments. Something new, some improvement, is constantly being made. In the field of subsurface geology, however, instruments really come into their own.

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Below the ground, in the subsurface, he must depend on instruments to substitute for these senses. Starting with his earliest crude information, samples from drill cuttings, scientists and inventors have given him a whole host of new instruments and tools to substitute for his own senses underground, or to bring to the surface samples of the formations below, in such shape as still to resemble their condition before they were disturbed by the bit.

TABLE 6—WELL COMPLETIONS IN FIRST QUARTER OF 1948 BY DEPTH CLASSIFICATIONS

Depth classifications	No. of comp.	Per cent of total	Cumulative per cent
0- 2,500 ft.	3,187	38.9	38.9
2,500- 5,000 ft.	3,355	41.0	79.9
5,000- 7,500 ft.	974	11.9	91.8
7,500-10,000 ft.	453	5.5	97.3
Over 10,000 ft.	219	2.7	100.0

Very early in his history the geologist began to examine drill cuttings under a microscope. He differentiated one formation from another, and estimated thicknesses. Now he has in addition such things as electric and radioactive logging, sidewall cores, bottom-hole cores, mud sniffers, drilling-time logging devices, fluoroscopic light, acid-residue logs, fossil index guides, heavy mineral content, porosity and permeability-measuring instruments, plus innumerable other instruments and tests that are being worked on experimentally in dozens of places.

Many of the geophysicist's flashier developments have been in the field of auxiliary tools, his service facilities. The swamp buggy and the sand buggy were simply vehicles to carry him and his instruments where an ordinary automobile couldn't travel. The same is true of the boats and diving bells he uses for water operations, or planes and helicopters for air operations.

Because his speed in covering ground with his geophysical instruments was being hampered by the limitations of old-style surveying methods, he has been and still is engaged in revolutionizing surveying methods. He has developed cameras to fit on conventional surveying transits, which substitute photographic records for old-style note taking. Elevation measurements were time consuming, so he invented the world's first successful automatic and continuous elevation-measurement device. Preliminary surveying for some seismograph work was taking too much time, so he borrowed the odograph from the Army. If he finds enough use for it, we can confidently expect to see the odograph improve and evolve beyond the Army's fondest dreams.

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When the geophysicist moved out over water, surveying really became

(Continued on page 202)

peak. New membership records are being established by both the American Association of Petroleum Geologists and the Society of Exploration Geophysicists. Naturally then it is not surprising that the joint annual meeting of exploration scientists just recently concluded in Denver, also established a new attendance record.

The offshore exploratory activity along the Gulf Coast gets a lot of publicity because of the spectacular nature of the operations. Its long-range importance is not minimized by any informed exploration scientist. But neither is that same scientist minimizing the future possibilities of the Gulf Coastal Plain area from the Mississippi Delta eastward to the tip of Florida. A lot of oil has been produced, and a lot more remains to be found between Brownsville and the Mississippi Delta. The same coastal plain extends around to Florida, and even though there are a lot of geological differences, the area is receiving plenty of exploration work.

The West Texas-Southeastern New Mexico area is receiving attention based on the firm ground that exploration work there will pay dividends for years to come, and that the present large production is from a comparatively early stage of development, particularly in the pre-Permian formations.

The Anadarko basin of Oklahoma has hardly been scratched. The four-corner area of Arizona-New Mexico-Utah-Colorado is the scene of plenty of exploration activity, mostly considered in the pioneering stage. The Uinta basin of northwestern Colorado-northeastern Utah has been stimulated by developments at Rangely. Inner-basin exploration all over Wyoming is yielding promising results, and that opens up an enormous area for many years of work. The Canadian trough, as the result of developments at Leduc-Woodbend, looks like a region due for exploration and development for a quarter century or longer. If the modernized technique of refraction seismograph works in the overthrust area along the front of the Rockies everywhere as well as it did in the Gulf Oil Corp. Pincher Creek strike in southern Canada, an area several hundred miles long will receive a play in hopes of finding more Turner Valley fields.

The exploration men have only one new tool in even moderate use, the airborne magnetometer, and that is not yet responsible for any of 1948's oil production. The exploration tools that bit by bit, a piece here and a piece there, have enabled production to be increased about 600,000 bbl. daily in the past year, are the improved versions of the old familiar ones. The oldest, surface geology, then subsurface geology, and the geophysical tools, mainly the gravity meter and the seismograph, are still the mainstays of the exploration scientists.

The use of aerial photography has increased steadily and quietly. It enables the surface geologist to study a broad regional pattern as a unit.

(Continued on page 155)

ELEVEN WELL COMPLETIONS PER DAY MORE THIS YEAR
(BASIS FIRST 17 WEEKS)

	First 17 weeks in 1948					Completions same period 1947	Increase 1948 over 1947
	Oil	Gas	Dry	Total comp.	Footage drilled (1,000's)		
New York	245	0	249	494	527	414	+ 80
Pennsylvania	402	67	416	885	1,622	968	— 83
West Virginia	29	152	48	229	586	256	— 27
Ohio	111	130	144	385	1,083	390	— 5
Indiana	147	19	119	285	502	176	+109
Kentucky	63	28	100	191	320	155	+ 36
Illinois	318	1	260	579	1,488	603	— 24
Michigan	77	10	109	196	461	177	+ 19
Kansas	420	84	288	792	2,598	794	— 2
Neb., Mo., Iowa	....	0	....	....	....	2	— 2
Oklahoma	666	64	428	1,158	3,962	1,272	—114
Texas	2,072	159	1,109	3,340	14,631	2,650	+690
N. Central	516	16	471	1,003	3,026	831	+172
West	765	8	132	905	4,192	624	+281
Panhandle	117	52	16	185	565	136	+ 49
Eastern	89	21	63	173	979	155	+ 18
Gulf Coast	291	29	203	523	3,305	503	+ 20
Southwest	294	33	224	551	2,564	401	+150
Louisiana	388	36	161	591	2,861	365	+226
Northern	272	30	87	389	1,064	177	+212
Southern	116	6	80	202	1,797	188	+ 14
Arkansas	54	0	41	95	401	73	+ 22
Mississippi	64	6	48	118	989	110	+ 8
S.E. States	1	0	13	14	76	15	— 1
Montana	49	1	22	72	203	52	+ 20
Wyoming	89	1	28	118	501	68	+ 50
Colorado-Utah	63	0	15	78	528	54	+ 24
New Mexico	148	14	36	198	880	166	+ 32
California	745	8	111	864	3,102	621	+243
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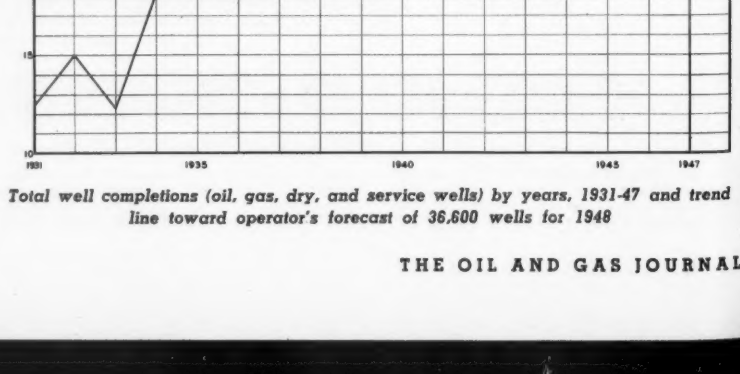

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(Continued on page 202)

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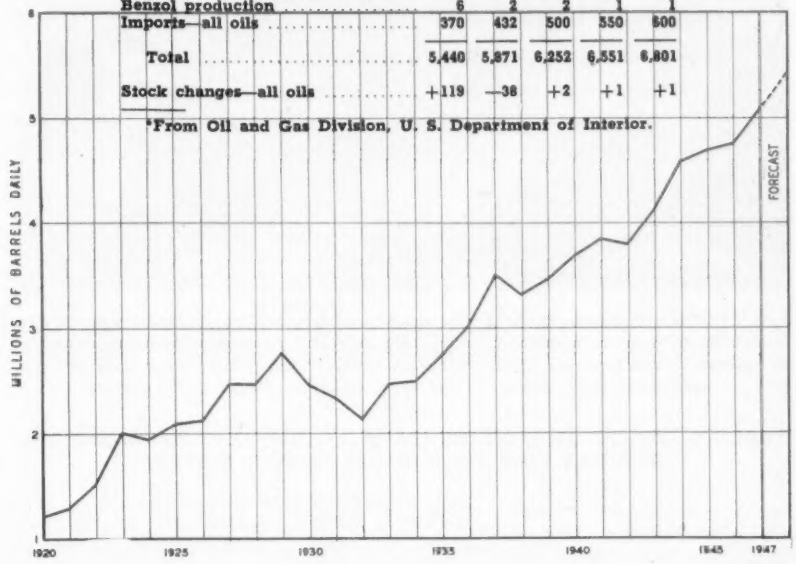
Chart shows the 400-per-cent-plus increase in crude oil production since 1920. Figures on "Supply" in the table, for 1948-1950, are the National Petroleum Council's estimates

PETROLEUM DEMAND AND SUPPLY FORECAST, UNITED STATES
(1,000 bbl. daily)

	1946	1947	1948	1949	1950
Demand—All oils—					
Domestic	4,907	5,451	5,825	6,150	6,400
Export	414	458	425	400	400
Total	5,321	5,909	*6,250	*6,550	*6,800
Supply—					
Domestic crude-oil production	4,749	5,077	5,350	5,575	5,760
Gasoline and cycling-plant prod.	315	360	400	425	440
Benzol production	6	2	2	1	1
Imports—all oils	370	432	500	550	600
Total	5,440	5,871	6,252	6,551	6,801
Stock changes—all oils	+119	—38	+2	+1	+1

*From Oil and Gas Division, U. S. Department of Interior.



Soaring Demand Prompts A Record Expansion in Industry's Producing Division

by Kenneth B. Barnes

RECORD capital investments of more than 4 billion dollars are being made in a 1947-1948 expansion program for new and improved facilities to serve the soaring demands for all kinds of oil products. An outlay of this magnitude in the 2-year period will represent more than 22 per cent of the total investment of about 18 billion dollars in the oil industry (which is the country's second largest). The projected capital investment is based on a survey of a number of companies which have actually budgeted outlays in the period totaling more than 3 billion dollars. Capital investments will be made in the four divisions of the industry, all of which, including crude-oil production, are at practical, or close to, maximum operating capacity.

The largest expenditures are being in production, the finding and developing of new oil reserves. One group of companies, for example, will spend close to 1 billion dollars in the production division alone in the 2-year period, and the total amount spent by the entire industry in this category probably will account for around 45 per cent of the over-all capital outlays.

In producing oil, conservation measures sponsored and supported by the petroleum industry also play an important role in the higher capital investments which are contemplated. Such conservation, which is designed to prevent waste and increase recoveries from given fields, has approximately doubled the recovery of oil from wells as compared with wide-open production in the early twenties, but has required greater capital expenditures.

Huge Demand for Crude

Recent forecast by the National Petroleum Council is that the total demand for all oils from the United States will average 6,250,000 bbl. daily over the year 1948. The demand will grow to 6,550,000 bbl. daily for 1949. Domestic crude-oil production of 5,350,000 bbl. daily average for 1948 and 5,575,000 bbl. daily in 1949 will be required to meet these demands. The domestic crude-oil production required in 1948 is nearly 5.4 per cent higher than 1947 production which set the record high to date.

The ability of the United States oil industry to provide sufficient crude-oil productive capacity to meet demands at any given time depends primarily upon the then-existing volume of proved and developed underground reserves, which in turn depends on the rate of discovery and development of new crude-oil reserves from year to year in relation to the demands. Analyses of the prewar historical relationship between the volume of proved underground crude-oil reserves and the growth in actual production and productive capacity made by the NPC indicates the need to discover and develop at least about 1⅞ bbl. of new crude oil reserves for each barrel produced during such time as the demand for crude continues to increase as it has in the past and as is forecast for the future.

The accompanying Table 1, prepared by the Journal, shows, state by state, the production situation for this year, up to approximately the time of the oil exposition, as compared similarly for last year. Total crude and condensate production on such basis is up an astounding 600,000 bbl. per day. Virtually every state in the list is in the "plus" column. An important industry division and due for further expansion in the future is the

PRODUCTION—Illustrative of one part of the oil-producing side of the industry at the 1948 International Petroleum Exposition are these 12 individual pumping units (they are set up to operate in synchronism). Capacities of the units in this group range from the very small 6,000 in.-lb. reducer to the extremely large 456,000 in.-lb. reducer

TABLE 1—CRUDE AND CONDENSATE PRODUCTION UP 600,000 BBL. PER DAY THIS YEAR (BASIS FIRST 17 WEEKS)

	Daily avg. prod. (bbl.) First 17 weeks 1947	1948	Increase 1948 over 1947	Per cent increase
Alabama	865	1,282	+ 417	+42.2
Arkansas	79,897	87,312	+ 7,415	+ 9.3
California	899,076	937,382	+ 38,306	+ 4.3
Colorado	37,630	45,985	+ 8,355	+22.2
Eastern	62,791	63,255	+ 464	+ 0.7
Florida	379	793	+ 414	+109.2
Illinois	191,676	172,018	— 19,658	—10.3
Indiana	17,959	18,129	+ 170	+ 0.9
Kansas	266,929	276,444	+ 9,515	+ 3.6
Kentucky	27,256	25,641	— 1,615	— 5.9
Louisiana	414,472	475,921	+ 61,449	+14.7
Northern	102,418	122,412	+ 19,994	+19.5
Southern	312,054	353,509	+ 41,455	+13.3
Michigan	42,618	46,092	+ 3,474	+ 8.1
Mississippi	86,525	114,978	+ 28,453	+32.9
Montana	22,508	23,864	+ 1,356	+ 6.0
Nebraska	662	476	— 186	—28.1
New Mexico	103,325	125,922	+ 27,597	+21.9
Oklahoma	369,676	405,556	+ 35,880	+ 9.7
Texas	2,061,715	2,406,284	+344,569	+16.7
District 1	19,997	25,606	+ 5,609	+28.0
District 2	147,883	170,424	+ 22,541	+15.2
District 4	227,224	254,347	+ 27,123	+11.9
District 3	456,106	494,707	+ 38,601	+ 8.5
District 5	36,500	44,306	+ 7,806	+21.4
District 6	106,509	121,413	+ 14,904	+14.0
East Texas field	316,511	311,406	— 5,105	— 1.6
District 7-C	32,406	43,743	+ 11,337	+35.0
District 8	472,806	669,560	+196,754	+41.6
District 7-B	35,734	43,791	+ 8,057	+22.5
District 9	126,505	140,227	+ 13,722	+10.8
District 10	83,534	86,754	+ 3,220	+ 3.9
Wyoming	106,563	136,317	+ 29,754	+27.9
Total United States (excl. condensate)	4,792,522	5,363,651	+571,129	+11.9
Total United States (condensate)	25,926	51,781	+ 25,855	+99.7
Total United States (incl. condensate)	4,818,448	5,415,432	+596,984	+12.4

I.P.E. MIRRORS PROGRESS

production of condensate—and significant of the trend is the 99.7 per cent increase (see Table 1) for this year.

Gas Sales Are Up

Natural-gas activities are steadily increasing, with a faster tempo in force all the way from well head to burner tip. Total sales of gas of all kinds by utility companies to ultimate customers in March were 3,124,745,000 therms, an increase of 6.8 per cent over sales in the comparable month last year, the American Gas Association reports. (A therm is a unit of measurement of gas supply which takes into account variations of heating value. For statistical purposes a therm is approximately equivalent to 190 cu. ft. of manufactured gas, 120 cu. ft. of mixed gas, or 95 cu. ft. of natural gas. A heating degree day is a measure of the extent to which the mean daily temperature falls below an assumed base, usually 65° F.)

The A.G.A. index of gas sales on March 31, 1948, stood at 235.1 per cent of the 1935-1939 average. For the 12 months ending March 31, sales of utility gas totaled 30,001,088,000 therms, a gain of 10.4 per cent over the previous comparable period.

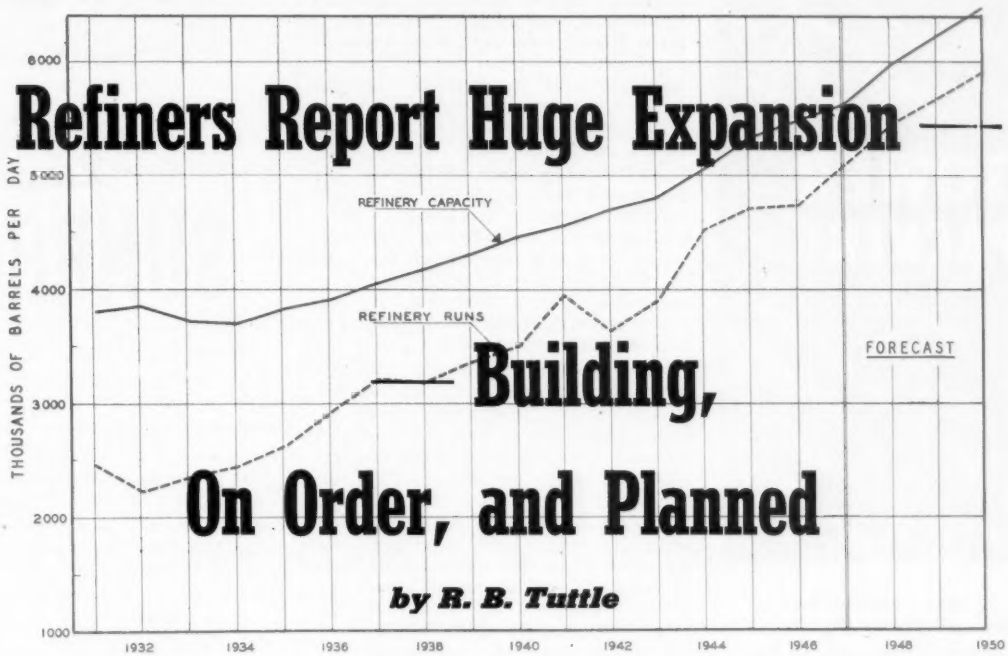
Natural-gas sales for March 1948 aggregated 2,731,091,000 therms, an increase of 8.8 per cent over last year. On March 31, 1948, the index of natural-gas sales stood at 240.9 per cent of the 1935-1939 average, the highest level of record. For the 12-month period natural-gas sales amounted to 26,186,028,000 therms, an increase of 11.6 per cent over the previous year.

Due to changeovers to straight natural gas by several important companies sales of mixed gas for March 1948 declined to 146,140,000 therms, a decrease of 20.9 per cent under the like month in 1947. The index of mixed gas sales on March 31, 1948, stood at 197.6 per cent of the 1935-1939 average. For the 12 months mixed-gas sales totaled 1,351,950,000 therms, a decline of 2.9 per cent compared with the year ending March 31, 1947.

The following table contains a summary of sales data for March of this year and for the 12 months ended March 31:

Gas classification—	Thousand therms 1948	1947	Per cent change
Month of March:			
Total	3,124,745	2,926,617	+ 6.8
Natural gas	2,731,091	2,509,343	+ 8.8
Manufactured gas	247,514	232,583	+ 6.4
Mixed gas	146,140	184,691	—20.9
12 mos. ended March 31:			
Total	30,001,088	27,179,494	+10.4
Natural gas	26,186,028	23,459,685	+11.6
Manufactured gas	2,463,110	2,327,248	+ 5.8
Mixed gas	1,351,950	1,392,561	— 2.9

(Continued on page 201)



Refiners Report Huge Expansion — Building, On Order, and Planned

by R. B. Tuttle

CURRENT reports on The Oil and Gas Journal's survey of expansion projects now building, authorized, or planned by operating companies in the United States and Canada, indicate heavy demand for equipment and construction material in the refining and hydrocarbon-synthesis divisions of the petroleum industry. Aside from the indication that much of the material and equipment for many of the larger projects are "on order," reports show there still remain a substantial number of smaller projects and some large ones which are yet in the planning stage. A number of other projects, large, medium, and small, are reported as being only recently approved or authorized for construction.

Construction is under way on 17 catalytic cracking units which have a combined nominal capacity rating of approximately 315,000 bbl. per day. To date the total number of catalytic cracking units of various types, either building, authorized, or planned for United States and Canadian refineries is reported at 21. Of this group three units are scheduled for Canadian plants of which none are reported as building at this time. However, one of the units, the larger, rated at 13,500 bbl. per day, has been approved and construction is expected to get under way soon. Another unit in Canada is in the planning stage according to late reports, and the third one, rated at 11,000 bbl. per day is under construction.

Modernization Programs

Work is in progress on the modernization and revamping of a number of catalytic cracking installations throughout the nation. At this time no significant figures on capacity rating increase are available on these catalytic units which are being revamped or modernized. Two and possibly three of the new refineries now being built are indicated to include catalytic cracking in their processing layout. Similar indications are evident in a few of the expansion projects involving over-all plant modernization.

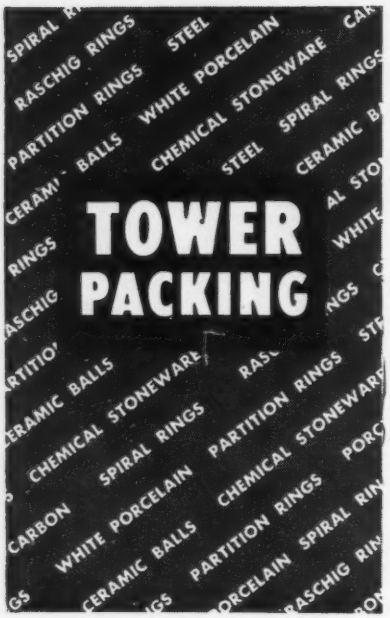
More than 100,000 bbl. per day of capacity rating is reported for the seven new refineries building and to be built in the United States. One new refinery is planned for Canada but its capacity rating has not been announced at this time. The increases provided by the seven new plants plus that from a large number of refinery-expansion projects now under way, authorized, and planned indicate crude-oil-capacity ratings for the nation's refineries will be nearly 6,500,000 bbl. per day by mid-1950.

Approximately 35 projects, planned or under way, involve capacity-rating increases on crude-oil-processing facilities in refineries across the United States. In round figures the increase is expected to be upwards of 350,000 bbl. per day when all of these projects have been rated. A substantial number of feed-preparation units for catalytic cracking operations are being built now and several more are being considered for completion before the end of next year.

Facilities for manufacturing lube oils are being increased in a substantial number of refineries. More than 20 different projects involving lube-oil production, in one phase or another, are building, authorized, or planned. These projects indicate a substantial boost in the nation's lube-production capacity. In addition to expansion of lube-production facili-

565,000 BBL. PER DAY MORE CRUDE CHARGED TO REFINERIES FIRST QUARTER THIS YEAR

	1947 1st quarter	1948 2nd quarter	Increase 1948 over 1947	Per cent increase
East Coast	755,467	822,121	+ 66,654	+ 8.8
Appalachian I	103,767	98,890	— 4,877	— 4.7
Appalachian II	64,255	70,692	+ 6,437	+10.0
Illinois, Indiana, etc.	804,956	851,561	+ 46,605	+ 5.8
Oklahoma, Kansas, etc.	392,556	432,791	+ 40,235	+10.2
Texas Inland	218,178	247,802	+ 29,624	+13.6
Texas Gulf	1,106,811	1,320,505	+213,694	+19.3
Louisiana Gulf	350,600	423,582	+ 72,982	+20.8
Arkansas, Louisiana Inland	62,122	77,956	+ 15,834	+25.5
New Mexico	8,611	11,539	+ 2,928	+34.0
Other Rocky Mountain	126,544	148,561	+ 22,017	+17.4
California	805,800	857,747	+ 51,947	+ 6.4
Total United States	4,799,667	5,363,747	+564,080	+11.8



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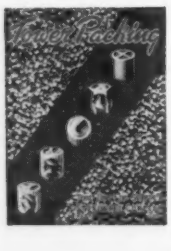

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ties in existing refineries, capacity ratings on those new refineries, now building and which include lube-oil-production equipment, represent a large figure. One new plant alone is rated at 6,000 bbl. per day for finished lubricating-oil production. Ratings on several of the lube-producing installations now building have not been announced. An estimate on these installations, based on the processing layout of the individual refinery, indicate the ratings of their additional lube-producing facilities will give a total production upwards of 16,000 bbl. per day for all new and expanded plants included in the accompanying table of refinery expansion projects.

Several units employing catalytic processes for reforming and desulfurization are now under construction. These units have a combined capacity rating of some 40,000 bbl. per day and range in rating sizes from 4,000 to 17,000 bbl. per day. A large number of catalytic polymerization units are being built now and construction on a few more is expected to start as soon as the projects have been authorized. By mid-year the total of new poly units building or authorized for construction is expected to run as high as 20.

Compounding and packaging-plant expansion projects now total four for the United States. Most of these projects are under construction at this time. One and possibly two more compounding plants are under consideration and authorization for their construction may be approved before the end of this year.

At several of the refineries where processing conditions permit, existing facilities for manufacturing asphalt are either being expanded or new units added.

Facilities for manufacture of chemicals in connection with other refining operations are being installed at two different refineries. Two of the processes are authorized for erection at one of the refineries of a West Coast company. A plant for the manufacture of synthetic detergents is being built by another company at one of its refineries located in the Atlantic Coast area.

Construction of two chemicals-recovery plants, for operation in connection with two hydrocarbon-synthesis plants, has been authorized. Both chemical plants, located in Texas and in Kansas, have been contracted to the same engineering and construction company. Contracts have also been let on the hydrocarbon-synthesis plants which are located in the same areas as are the chemicals - recovery plants. Each synthesis plant is contracted to a different company. Construction progress on one plant is well under way whereas the other is just starting construction, according to reports from the operating companies.

(See table beginning Page 165)

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REFINERY-CONSTRUCTION PROJECTS

Company, location and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Aetna Oil Co., Louisville:				
Storage, bbl.	105,000	Building	Mid '48	Chicago Bridge & Iron Co
American Liberty Oil Co., Mount Pleasant, Tex.:				
Polymerization unit, bbl. per day	173	Building	June '48	.....
L.P.G. manufacturing facilities, bbl. per day	211	Building	June '48	.....
Ashland Oil & Refining Co., Catlettsburg, Ky.:				
Cat. cracker modernization, bbl. per day	10,000	Building	Late '48	Catalytic Construction Co.
Atlantic Refining Co., Philadelphia:				
Synthetic-detergent manufacture, bbl. per day	75,000	Building	Mid '48	None
Lube plant, bbl. per day	1,300	Building	Mid '48	E. B. Badger & Sons Co.
Wax-plant addition, tons per day	155	Building	1948	The Lummus Co.-The M. W. Kellogg Co.
Steam-generating-plant extension, lb. per hour	150,000	Building	Mid '48	The Babcock & Wilcox Co.
Atlantic Refining Co., Port Arthur, Tex.:				
Refining-capacity increase, bbl. per day	15,000	Planned	1948	.....
Atomic Producing & Refining Co., Albany, Ky.:				
TEL plant	.....	Planned	1948	.....
Additional storage	.....	Planned	1948	.....
Bareco Oil Co., Wichita:				
Cat. desulfurization-reforming, bbl. per day	4,000	Building	Mid '48	Koch Engineering Co., Inc.
L.P.G. plant, bbl. per day	200	Building	Mid '48	Born Engineering Co.
Berry Asphalt Co., Waterloo, Ark.:				
Vacuum lube unit, bbl. per day	1,200	Building	Mid '48	Process Engineers, Inc.
Berry Asphalt Co., Stephens, Ark.:				
Plant expansion	.....	Planned	.....	.....
British-American Oil Co., Ltd., Port Moody, Canada:				
New refinery	.....	Planned	.....	.....
British-American Oil Co., Ltd., Montreal:				
Fluid cat. cracking unit, bbl. per day	13,500	Authorized	Late '49	The M. W. Kellogg Co.
Cat. polymerization unit, bbl. per day	500	Authorized	Late '49	The M. W. Kellogg Co.
Crude-distillation unit, bbl. per day	14,500	Authorized	Late '49	The M. W. Kellogg Co.
Cat. polymerization unit, bbl. per day	200	Building	Mid '48	Koch Engineering Co., Inc
Calumet Refining Co., Princeton, La.:				
Remodeling distillation equipment	.....	Building	1948	.....
Steam-generating plant	.....	Building	1948	.....
Additional storage	.....	Building	1948	.....
Carter Oil Co., Billings, Mont.:				
New refinery, bbl. per day	20,000	Building	Mid '49	Fluor Corp., Universal Oil Prod.
Carthage Hydrocol, Inc., Brownsville, Tex.:				
Gas-processing plant, cu. ft. per day	64,000,000	Building	Late '48	Arthur G. McKee & Co.
Citcon Corp., Lake Charles, La.:				
Lube-oil plant, bbl. per day	6,000	Building	Late '48	The Lummus Co.-Max B. Miller
Cities Service Oil Co. (Del.), Chicago, Ill.:				
Compound plant, bbl. per day	1,200	Authorized	Mid '49	Sumner S. Sollitt Co.
Cities Service Oil Co. (Del.), East Chicago, Ind.:				
Skimming and cracking, bbl. per day	35,000	Building	Late '48	The M. W. Kellogg Co.
Continental Oil Co., Billings, Mont.:				
New refinery, bbl. per day	6,800	Building	1949	Jones & Laughlin Supply Co
Continental Oil Co., Denver:				
Crude capacity increase, bbl. per day	6,750	Building	Late '48	The Lummus Co.
Catalytic cracking	.....	Building	Late '48	.....
Catalytic polymerization	.....	Building	Late '48	.....
Continental Oil Co., Ponca City, Okla.:				
Modernize T.C.C. unit	20,000	Building	Mid '48	Catalytic Construction Co.
Cooperative Refinery Association, Coffeyville, Kans.:				
M.E.K. dewaxing unit, bbl. per day	2,200	Building	Early '49	Process Engineers, Inc.
Cosden Petroleum Corp., Big Spring, Tex.:				
Cat. cracking unit, bbl. per day	5,500	Considered	.....	.....
Dewese Oil Refinery, Weston, Ohio:				
Lube-oil filtering equipment	.....	Building	1948	.....
Desalting facilities	.....	Building	1948	.....
Elk Refining Co., Falling Rock, W. Va.:				
Crude-oil still	.....	Building	Mid '48	.....
Empire Petroleum Co., Denver:				
Crude-oil distillation unit, bbl. per day	3,000	Planned	.....	.....
Additional storage tanks, bbl.	100,000	Planned	.....	.....
Asphalt storage warehouse	.....	Planned	.....	.....
Esso Standard Oil Co., Baton Rouge, La.:				
Atmospheric pipe still, bbl. per day	58,000	Building	Late '48	Arthur G. McKee & Co.
Vacuum pipe stills (2), bbl. per day	33,000	Building	Late '48	Arthur G. McKee & Co.
Recovery unit, cu. ft. per day	20,000,000	Building	Late '48	Arthur G. McKee & Co.
Polymer plant, bbl. per day	4,000	Building	Late '48	Arthur G. McKee & Co.
Light-ends processing unit, bbl. per day	11,000	Building	Late '48	Arthur G. McKee & Co.
Dewaxing plant, bbl. per day	4,000	Building	Late '48	Arthur G. McKee & Co.
Esso Standard Oil Co., Linden, N. J.:				
Catalytic cracking unit, bbl. per day	41,000	Building	Early '49	C. F. Braun Co.
Vacuum distillation unit, bbl. per day	49,000	Building	Early '49	C. F. Braun Co.
Fen Ter Refining Co., Wynnewood, Okla.:				
Asphalt unit	.....	Planned	.....	.....
General Petroleum Corp., Torrance, Calif.:				
Revamping crude unit, bbl. per day	32,000	Building	Late '48	C. F. Braun Co.
Gilcrease Oil Co., Arabi, La.:				
New skimming plant, bbl. per day	5,000	Building	Mid '48	Ampco Engr. & Const. Co.
Gulf Oil Corp., Philadelphia:				
Vacuum unit, bbl. per day	12,000	Building	.....	The Lummus Co.
Naphtha polyform unit	.....	Building	.....	The Lummus Co.
Gulf Oil Corp., Port Arthur, Tex.:				
Three topping and vacuum units, bbl. per day	66,000	Building	Mid '48	E. B. Badger & Sons Co.
Catalytic desulfurization unit, bbl. per day	17,000	Building	Mid '48	The Lummus Co.
Naphtha polyform unit	.....	.....	.....	.....
Gulf Refining Co., Cincinnati:				
Catalytic cracking unit, bbl. per day	15,000	Building	Mid '49	The M. W. Kellogg Co.
Polymerization unit	.....	.....	.....	.....
Gulf Refining Co., Toledo:				
Topping and vacuum unit, bbl. per day	32,000	Building	Oct. '48	E. B. Badger & Sons Co.
Catalytic cracking unit, bbl. per day	15,500	Building	May '49	.....
Polymerization unit	.....	.....	May '49	The M. W. Kellogg Co.

REFINERY-CONSTRUCTION PROJECTS (Continued)

Company, location and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Humble Oil & Refining Co., Baytown, Tex.:				
Pipe still, bbl. per day	45,000	Contracted	Late '49	Foster Wheeler Corp.
Loading docks	.....	Building	Late '48	Horrace Williams
Husky Refining Co., Lloydminster, Canada:				
Capacity increase, bbl. per day	5,000	Planned	.....	.....
Imperial Oil, Ltd., Edmonton, Canada:				
Moving refinery, bbl. per day	6,000	Building	Late '48	M. W. Barnes
Imperial Oil, Ltd., Montreal, Canada:				
Fluid cat. cracking unit, bbl. per day	11,000	Building	Mid '48	The M. W. Kellogg Co.
Cat. Polymerization unit, bbl. per day	4,200	Building	Mid '48	The M. W. Kellogg Co.
Enlarge crude unit, bbl. per day	13,200	Building	Mid '48	The M. W. Kellogg Co.
Indiana Farm Bureau Cooperative Association, Inc., Mount Vernon, Indiana:				
Revamp crude unit, bbl. per day	8,600	Building	.....	.....
Kanotex Refining Co., Arkansas City, Kans.:				
Cat. desulfurization-reforming, bbl. per day	4,200	Building	Mid '48	Koch Engineering Co., Inc.
Lakeside Refining Co., Kalamazoo, Mich.:				
Additional storage, bbl.	25,000	Building	Early '48	.....
Magnolia Petroleum Co., Beaumont, Tex.:				
Dewaxing unit, bbl. per day	4,500	Building	.....	.....
Solvent-extraction unit, bbl. per day	3,500	Building	.....	.....
Crude still, bbl. per day	6,500	Building	.....	.....
Vacuum unit, bbl. per day	10,000	Building	.....	.....
McColl-Frontenac Oil Co., Ltd., Montreal, Que.:				
Cat. cracking and cat. poly units	.....	Building	Mid '48	The M. W. Kellogg Co.
McMurrey Refining Co., Tyler, Tex.:				
Polymerization unit	.....	Building	1948	.....
MFA Oil Co. (Ref. Div.), Chanute, Kans.:				
Desulfurization facilities	.....	Planned	1948	.....
Mid-Continent Petroleum Corp., West Tulsa:				
Cat. cracking unit, bbl. per day	17,500	Building	Late '48	The M. W. Kellogg Co.
Midland Co-op. Wholesale, Cushing, Okla.:				
Modernize crude unit, bbl. per day	6,500	Building	Mid '48	Refinery Engineering Co.
Monarch Refineries, Inc., Oklahoma City:				
Vacuum lube unit	.....	Planned	.....	.....
North Star Refining Co., Shelby, Mont.:				
Moving refinery, bbl. per day	.....	Planned	.....	.....
Ohio Oil Co., Robinson, Ill.:				
Fluid cat. cracking unit, bbl. per day	12,400	Building	Early '49	Arthur G. McKee & Co.
Atmospheric and vacuum unit, bbl. per day	27,500	Building	Early '49	Arthur G. McKee & Co.
Catalytic polymerization unit, bbl. per day	4,000	Building	Early '49	Arthur G. McKee & Co.
Steam-generator extension, lb. per hour	240,000	Building	Early '49	Arthur G. McKee & Co.
Electric-generator extension, kw.	10,000	Building	Early '49	Arthur G. McKee & Co.
Cooling tower and other facilities	.....	Building	Early '49	J. F. Prichard Co.
Paraffine Cos., The., Inc., Emeryville, Calif.:				
Two asphalt stills, bbl.	720	Building	.....	.....
Superheater for stills	.....	Building	.....	.....
Phillips Petroleum Co., Kansas City, Kans.:				
Catalytic cracking unit, bbl. per day	24,000	Building	Late '49	C. F. Braun & Co.
Catalytic polymerization unit, bbl. per day	1,500	Building	Late '49	C. F. Braun & Co.
Compounding plant	.....	Building	Late '48	Winn-Senter, Phillips
Lubricating oil unit, bbl. per day	1,500	Building	Late '48	The M. W. Kellogg Co.
Producers Refinery, Inc., West Branch, Mich.:				
Refinery expansion, bbl. per day	1,500	Planned	1948	.....
Pure Oil Co., The, Nederland, Tex.:				
Crude unit	.....	Building	Mid '48	Foster Wheeler Corp.
Lube plant	.....	Building	Late '48	The Lummus Co., The M. W. Kellogg Co.
Compounding and blending plant	.....	Building	Late '48	Stone & Webster Engr. Co.
Pure Oil Co., The., Toledo:				
Naphtha-manufacturing unit	.....	Authorized	Late '48	.....
Radio Oil Refineries, Ltd., East Kildonan, Canada:				
Capacity increase, bbl. per day	1,000	Building	Early '48	.....
Rock Island Refining Corp., Indianapolis:				
Catalytic cracking unit, bbl. per day	5,000	Authorized	Early '49	.....
Root Petroleum Co., El Dorado, Ark.:				
Topping heater	.....	Building	.....	.....
Shamrock Oil & Gas Corp., Sunray, Tex.:				
Capacity increase, crude unit, bbl. per day	2,200	Building	Mid '48	.....
Shell Oil Co., Inc., Wilmington and Martinez, Calif.:				
Extensions (motor lab., insecticide and absorption plants)	.....	Building	Mid '48	Shell, Bechtel Corp., Ralph M. Parsons Co.
Shell Oil Co., Inc., Houston:			Mid '48	The Lummus Co., The M. W.
Lube plant, bbl. per day	2,800	Building		Kellogg Co., Fluor Corp.
Shell Oil Co., Inc., Norco, La.:				
Fractionator, bbl. per day	12,000	Building	Mid '48	.....
Cracked asphalt plant, tons per year	30,000	Building	Early '48	.....
Sinclair Refining Co., East Chicago, Ind.:				
Fluid cat. cracking unit, bbl. per day	25,000	Building	Early '48	C. F. Braun Co.
Lube-treating plant, bbl. per day	2,500	Building	Mid '48	The Lummus Co.
Polymerization unit	.....	Building	Early '48	C. F. Braun Co.
Crude unit, bbl. per day	30,000	Building	Mid '48	C. F. Braun Co.
Sinclair Refining Co., Marcus Hook, Pa.:				
Fluid cat. cracking unit, bbl. per day	25,000	Building	Early '48	C. F. Braun Co.
Polymerization unit	.....	Building	Early '48	C. F. Braun Co.
Vacuum unit, bbl. per day	24,000	Building	Early '48	C. F. Braun Co.
Sinclair Refining Co., Houston:				
Crude unit, bbl. per day	30,000	Building	Early '48	The Fluor Corp., Ltd.
Grease works and barrel house	.....	Building	Mid '48	The Fluor Corp., Ltd.
Skelly Oil Co., Eldorado, Kans.:				
Additional solvent-manufacturing facilities	.....	Planned	.....	.....
Socony-Vacuum Oil Co., Inc., Paulsboro, N. J.:				
Crude unit	.....	Building	Early '49	E. B. Badger & Sons Co.
Lube unit	.....	Building	Early '49	E. B. Badger & Sons Co.

REFINERY-CONSTRUCTION PROJECTS (Continued)

Company, location and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Socony-Vacuum Oil Co., Inc., Casper, Wyo.:				
Cat. cracking unit	8,000	Building	Early '49	Catalytic Construction Co.
Topping facilities and gas plant	.....	Building	Late '48	Catalytic Construction Co.
Socony-Vacuum Oil Co., Inc., East St. Louis, Ill.:				
Refinery expansion	.....	Building	Early '49	Bechtel Corp.
Southwestern Oil & Refining Co., Corpus Christi, Tex.:				
Cat. cracking unit, bbl. per day	6,000	Contracted	1949	Process Engineers, Inc.
Cat. reformer, bbl. per day	5,000	Contracted	Late '48	Process Engineers, Inc.
Topping unit, bbl. per day	25,000	Contracted	Early '49	Process Engineers, Inc.
Standard Oil Co. of British Columbia, North Burnaby, B. C., Canada:				
Asphalt production and shipping facilities	.....	Building	.....	.....
Standard Oil Co. of Calif., Salt Lake City, Utah:				
Refinery, bbl. per day	25,000	Building	.....	Bechtel Corp.
Standard Oil Co. of Calif., Bakersfield:				
Cat. cracking unit, bbl. per day	10,000	Authorized	Mid '49	.....
Alteration to crude unit, bbl. per day	20,000	Authorized	Mid '49	.....
Standard Oil Co. of Calif., Richmond, Calif.:				
Wax plant	.....	Building	Late '48	.....
Standard Oil Co. of Calif., El Segundo, Calif.:				
Modernize filling plant	.....	Building	Late '48	.....
Standard Oil Co. (Ind.), Whiting, Ind.:				
Cat. cracking unit, bbl. per day	25,000	Building	1948	The M. W. Kellogg Co.
Expanding crude and coking units, bbl. per day	27,000	Building	1948	The Lummus Co.
Standard Oil Co. (Ind.), Sugar Creek, Mo.:				
Cat. cracking unit, bbl. per day	25,000	Building	1948	The M. W. Kellogg Co.
Standard Oil Co. (Ind.), Casper, Wyo.:				
Cat. cracking unit, bbl. per day	8,000	Building	1949	The M. W. Kellogg Co.
Standard Oil Co. (Ohio), Lima, Ohio:				
Cat. cracking unit, bbl. per day	20,000	Building	Late '49	Arthur G. McKee & Co.
Gas-recovery unit	.....	Building	Late '48	.....
Standard Oil Co. (Ohio), Latonia, Ky.:				
Waste-oil separator	.....	Authorized	Late '48	.....
Stanolind Oil & Gas Co., Hugoton field, Kansas:				
Hydrocarbon synthesis plant, cu. ft. per day	100,000,000	Authorized	Early '50	The M. W. Kellogg Co., Foster Wheeler Corp., Stone & Webster Engineering Co.
Chemicals recovery and refining, lb. per year	100,000,000	Authorized	Early '50	E. B. Badger & Sons Co.
Stanolind Oil & Gas Co., Brownsville, Tex.:				
Chemicals recovery and refining, lb. per year	100,000,000	Authorized	Mid '49	E. B. Badger & Sons Co.
Sun Oil Co., Toledo, Ohio:				
Alterations to Houdry unit, bbl. per day	20,000	Building	Early '48	Catalytic Construction Co.
Topping and cat. cracking units	30,000	Authorized	Late '49	Catalytic Construction Co.
Sun Oil Co., Marcus Hook, Pa.:				
Furfural unit, bbl. per day	2,000	Building	Mid '48	Process Engineers, Inc.
Additions to M.E.K. unit	.....	Building	Mid '48	Process Engineers, Inc.
Packaging and compounding plant	.....	Building	.....	.....
Sunray Oil Corp., Allen, Okla.:				
Modernizing vacuum unit	.....	Building	Early '48	.....
Sunray Oil Corp., Duncan, Okla.:				
Expanding refining facilities, bbl. per day	20,000	Building	Early '48	The Refinery Engineering Co., Mason Bros. Const. Co.
Polymerization unit, bbl. per day	1,000	Building	Mid '48	Refinery Engineering Co.
Texas Co., The, Westville, N. J.:				
New refinery, bbl. per day	40,000	Building	Mid '49	Foster Wheeler Corp., The M. W. Kellogg Co., Jackson-Moreland
Texas Co., The, West Tulsa:				
Refinery modernization, bbl. per day	30,000	Building	Mid '49	Foster Wheeler Corp., The M. W. Kellogg Co., Universal Oil Products Co.
Texas Co., The, Port Arthur, Tex.:				
Expansion of lube facilities	.....	Building	Early '49	Foster Wheeler Corp.
Alteration of treating facilities	.....	Building	Early '49	Foster Wheeler Corp.
Texas Co., The, Lawrenceville, Ill.:				
Refinery expansion, bbl. per day	20,000	Contracted	.....	Foster Wheeler Corp., The M. W. Kellogg Co.
Tide Water Associated Oil Co., Bayonne, N. J.:				
Crude unit, bbl. per day	22,500	Building	Early '49	J. F. Prichard & Co.
Propane deasphalting unit, bbl. per day	3,400	Building	Early '49	J. F. Prichard & Co.
Furfural unit, bbl. per day	8,750	Building	Early '49	J. F. Prichard & Co.
Trans-Marine Oil & Ref. Co., South Milwaukee, Wis.:				
Refinery, bbl. per day	5,000	Contracted	Late '48	Refinery Engineering Co.
Trinidad Leaseholds (Canada), Ltd., Port Credit, Canada:				
Treating plant	.....	Planned	.....	.....
Troy Refining Co., Inc., Troy, Ind.:				
Moving and expanding refinery	.....	Considered	.....	.....
Union Oil Co. of Calif., Oleum, Calif.:				
Lube-oil plant, bbl. per day	1,100	Planned	Mid '49	.....
Union Oil Co. of Calif., Wilmington, Calif.:				
Ethylene plant, tons per year	15,000	Authorized	Early '49	Foster Wheeler Corp.
Hydrogen sulfide unit, tons per year	4,500	Authorized	Early '49	.....
United Refining Co., Warren, Pa.:				
New laboratory	.....	Planned	.....	.....
Boiler capacity increase	.....	Planned	.....	.....
Utah Oil & Refining Co., Salt Lake City, Utah:				
Propane deasphalting unit, bbl. per day	10,000	Contracted	Early '49	The M. W. Kellogg Co.
Boiler plant extension, lb. per hour	65,000	Contracted	Early '49	Stearns-Roger Mfg. Co.
Waggoner Estate Refinery, Electra, Tex.:				
Modernize thermal cracking unit, bbl. per day	3,000	Building	Late '48	Refinery Engineering Co.
Western States Refining Co., North Salt Lake, Utah:				
New refinery, bbl. per day	1,500	Building	.....	.....
Winnsboro Refining Co., Winnsboro, Tex.:				
New refinery, bbl. per day	2,800	Building	Early '48	Petro Chemical Engineering & Construction Co.
Wood River Oil & Refining Co., Hartford, Ill.:				
Vacuum unit, bbl. per day	5,000	Building	Early '49	Koch Engineering Co., Inc.
Cat. desulfurization-reforming, bbl. per day	8,500	Building	Mid '48	Koch Engineering Co., Inc.

FREE AIR?

NOT ON YOUR LIFE!!

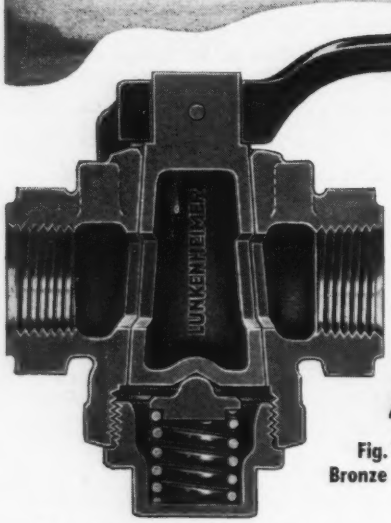

Fig. 1571
Bronze Air Cock

COMPRESSED AIR
is a Valuable Tool . . .
but costly if wasted!

SAVE IT with
LUNKENHEIMER Air Devices

That h-i-s-s-s-s-s you may hear around your air lines means there's a villain loose in your plant. Costly compressed air is escaping, costing you money by the minute. But, you say . . . "it's only a pinhole, can't amount to much." Look at the chart below.

A SMALL LEAK MAY COST YOU AS MUCH AS $5.82 A MONTH.

AREA OF LEAK	AIR	
Diameter Inches	Number of cubic feet per month at 75 lb. pressure	Total cost of waste per month 11c per 1000 cubic feet
1/4"	3,366,990	$ 370.37
1/8"	824,570	$ 90.70
1/16"	213,000	$ 23.43
1/32"	52,910	$ 5.82

Check your plant . . . compressed air leaks mean that good dollars are "gone with the wind." Replace leaky or defective air devices with LUNKENHEIMER Air Cocks, Valves, Nozzles. Designed for air line service, LUNKENHEIMER Air Devices seat tight and stay tight, requiring minimum maintenance for long, efficient service life.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

CINCINNATI 14, OHIO. U. S. A.

NEW YORK 13 CHICAGO 6
BOSTON 10 PHILADELPHIA 34

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Stop those air leaks now. Your Lunkenheimer Distributor has a stock of Cocks, Globe and Angle Valves, Nozzles, Safety Valves, Check Valves, Tips, Nipples and other fittings for your needs. *Write for Circular No. 587 and enlarged copy of air leak chart, suitable for posting.*

Fig. 1840
Air Nozzle
Available with
various tips.

Fig. 1227
Pop Safety Valve
for Air

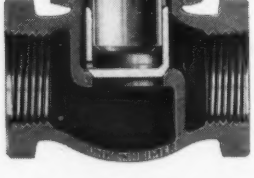
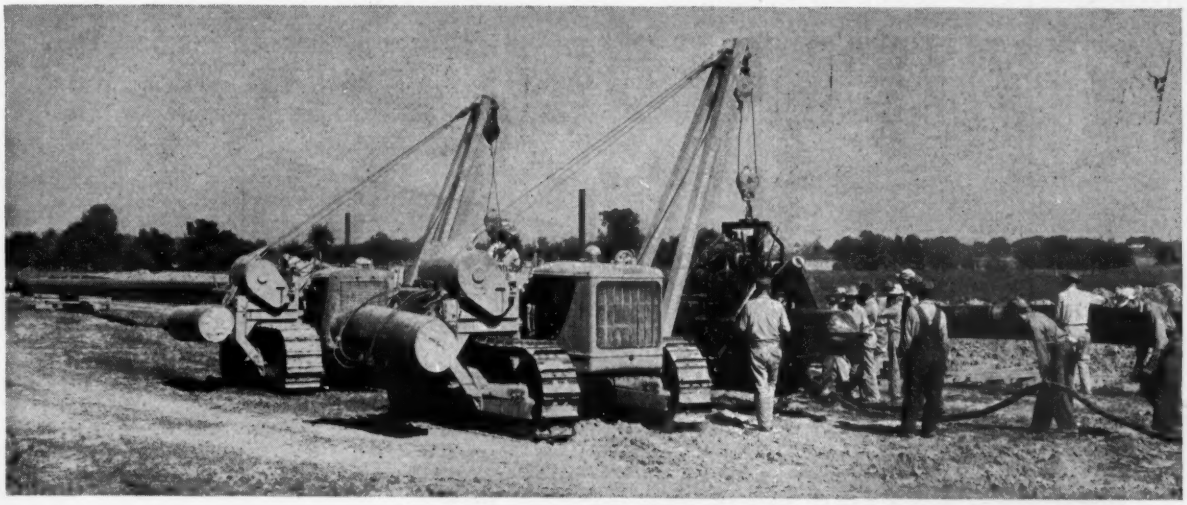


Fig. 1616
Air Compressor
Check Valve...
Hollow Stainless
Steel Disc



Boom tractors handling equipment for coating and wrapping operations on a section of 22-in. pipe being laid near Waterloo, Ill., in connection with a pipe line project for transmitting Louisiana natural gas to Wood River, Ill.

Pipe-Line Activity at All-Time Peak; World Program Totals 38,000 Miles

by Paul Reed

IN carrying out the huge 38,000-mile program announced for pipe-line construction in 1948 and future years, the industry will utilize recent advancements in techniques which are reflected in the exhibits of equipment for pipe-line construction and operation at the International Petroleum Exposition.

Already at this time in the spring of the year pipe laying is being carried out for projects totaling 10,000 miles, including 5,400 miles in the United States and 4,600 miles in foreign countries.

Crude-oil lines totaling more than 11,200 miles are planned, under way, or already completed this year. Of these, 5,800 miles are in the United States and 5,400 miles are in foreign countries. Efforts are being pushed to extend pipe-line systems to connect all producing areas which have promise for relieving the crude-oil shortage.

Plans for 17,950 miles of natural-gas lines predominate in future prospects for pipe-line construction. Of these lines, 15,550 miles is for lines in the United States and 1,400 miles for foreign lines.

Construction for 1,880 miles of products pipe lines now under way is far above magnitude of such programs in a normal year.

For the 18-month period from April 1, 1948, to October 1, 1949, National Petroleum Council reports estimate a total of 4,238,786 tons of steel pipe will be required for pipe-line construction in the United States and abroad.

Foreign requirements totaling 621,103 tons in this estimate include 197,463 tons for the Western Hemisphere, excluding Mexico, and 423,640 tons for the Eastern Hemisphere, not including the U.S.S.R.

The 3,617,683 tons of line pipe required for the United States includes 2,122,400 tons for natural gas lines and 1,495,283 tons for petroleum lines, exclusive of 25,950 tons for certain California lines reported without mileage estimates.

The United States petroleum lines, in the NPC estimates, for which mileage is reported, represent a total of 17,219 miles consisting of 3,811 miles of pipe with diameter of 16 in. and larger, 9,343 miles of 6⅝ to 14 in., inclusive, and 4,065 miles of 2 in. to 5 in.

The greatest campaign in crude-oil pipe-line construction is being carried on by several companies laying big-inch lines from Oklahoma and Texas, which are increasing throughput into the Illinois-Indiana area from 659,500 bbl. daily in 1947 to 1,025,500 bbl. daily in 1949. This work will relieve the most critical transportation shortage in petroleum operations. Stanolind Pipe Line Co.'s 20-22-in. looping from Drumright, Okla., nearly completed early this year, adds 80,000 bbl. daily to serve the Wood River, Ill.-Whiting, Ind., areas. Magnolia Pipe Line Co. expects to complete next month its 648-mile 20-in. line from Corsicana, Tex., to Patoka, Ill., with capacity for 100,000 bbl. Another 186,000 bbl. daily will be added to throughput to Wood River by the construction of joint ownership big-inch facilities being built from Jal, N. M., which will be completed next year.

In connection with these facilities, construction is well advanced on the Jal, N. M.-Cushing, Okla., system consisting of 500 miles of 20-22-24-in. line undertaking by Texas Pipe Line Co., Shell Pipe Line Corp., Empire Pipeline Co., and Sinclair Refining Co. The continuation of these facilities northeastward from Cushing, known as Ozark Pipe Line System, to be built by Shell Pipe Line, and Texas

Large Producer SOLVES WEATHERFORD METHODS

A large producer, using WEATHERFORD SPIRAL CENTRALIZERS and REVERSIBLE SCRATCHERS for the past year, writes:*

"The first well on which this Company applied the use of scratchers and centralizers was set with seven-inch casing at a depth of 10,720 feet on March 12, 1947, and the result was a successful cementing job.

Since that time the company has used scratchers and centralizers on 26 additional wells, and the results have all been highly satisfactory.

Prior to the adoption of these devices, our company was forced to make many squeeze jobs on wells in order to obtain a successful cement job. Since March of last year, however, it has not been necessary for our company to squeeze cement into a single new well.

Thousands of dollars have been saved, and the operating efficiency on our producing wells has jumped to a new high. That record in itself tells the story.

The era of faulty cement jobs and costly squeezing operations is gone—another fitting testimonial to our companies' far-sighted policy of seeking the best in operating efficiency."

* Quoted from the House Organ of a large Oil and Gas Producer

TABLE 1—MAJOR DOMESTIC CRUDE-OIL PROJECTS
1948-51 (announced)

Company—	Miles	Inch	Status	Contractor and location
Arizona Pipe Line Co.	600	8	Planned	Permian basin-Phoenix, Ariz.
Buckeye Pipe Line Co. and Sohio Pipe Line Co.	110	12	Planned	Sheehan Pipe Line Construction Co.—Cygnet to Cleveland, Ohio.
Frontier Refining Co.	65	..	Planned	Mush Creek and Ant Hill, Colo., to Rocky Mountain Pipe Line Co. system.
Gulf Refining Co.	82	8-10	Completed	Smith Contracting Co., Latex Construction Co.—Midland-Lufkin, Tex., loops.
Humble Pipe Line Co.	24	12	Under way	Sheppard-Geiger Const. Co.—Lytle-Ingleside, Tex.
Humble Pipe Line Co.	30	6-8	Completed	Gathering lines.
Interstate Oil Pipe Line Co.	52	12	Completed	Midwestern Const., Inc.—Oklahoma City-Maysville, Antioch, Okla.
Magnolia Pipe Line Co.	648	20	Under way	Oklahoma Contr. Co., H. C. Price & Co., Eastern Const. Co., O. C. Whitaker Co.—Corsicana, Tex.-Patoka, Ill.
Mid-Continent Pipe Line Co.	30	4-6	Completed	C. P. Carter, A. C. Holder—Canadian River, Oklahoma, area.
Portland Pipe Line Co.	236	20	Planned	Portland, Me.-Montreal, Que., Canada.
Rocky Mountain Pipe Line Co. (Continental)	100	10	Under way	Osage Const. Co.—Denver, Colo.-Cheyenne, Wyo.
Rocky Mountain Pipe Line Co.	18	10	Under way	Goldenstern & Stolper—Cheyenne, Wyo.
Rocky Mountain Pipe Line Co.	30	8	Under way	Goldenstern & Stolper—Chugwater, Wyo.
Salt Lake Pipe Line Co.	181	8-10	Planned	Pacific Pipe Line & Engineers, Ltd.—Rangely, Colo., to Salt Lake City, Utah.
Shell and other companies	900	20	Planned	Midland, Tex.-Wilmington, Calif.
Shell Pipe Line Corp.*	435	22	Planned	Cushing Station, Okla., to Wood River Ref., Ill.
Shell Pipe Line Corp.	72	12-14	Planned	Wasson, Tex., to Jal, N. M.
Shell Pipe Line Corp.	20	10	Planned	Wheeler Station to Wink, Tex.
Shell Pipe Line Corp.	17	6-8	Completed	Morrison Bros.—West Texas.
Skelly Oil Co. pipe-line department	9	6	Completed	Bishop & Lock Const. Co.—Velma field, Stephens County, Oklahoma.
Socony-Vacuum Oil Co., Inc. (White Eagle Division)	42	6	Under way	Knupp Const. Co.—Graham County, Kansas, to Sheridan County, Kansas.
Standish Pipe Line Co. (Phillips Pet. Co.)	289	12	Planned	Goldsmith-Borger, Tex.
Stanolind Pipe Line Co.	263	20-22	Completed	O. C. Whitaker Co., Associated Cont. & Engrs., J. R. Horrigan Const. Co.—La Plata, Mo.-Manhattan, Ill., Drumright, Okla-Whiting, Ind.
Stanolind Pipe Line Co.	51	8	Completed	Post pool-Petersburg, Tex.
Stanolind Pipe Line Co.	81	16	Under way	R. H. Fulton & Co.—Slaughter, Tex.-Drumright, Okla. (175-mile, 16-in. looping).
Stanolind Pipe Line Co.	82	16	Planned	Wheeler-Wasson, Tex., extension.
Stanolind Pipe Line Co.	54	8	Planned	Wamsutter-Casper, Wyo.
Stanolind Pipe Line Co.	12	20	Completed	Mid-Western Const., Inc.—Hominy-Nelagoney, Okla.
Stanolind Pipe Line Co.	57	12	Planned	Lost Cabin-Casper, Wyo.
Stanolind Pipe Line Co.	255	16	Planned	Casper, Wyo.-Freeman, Mo. Looping also includes 55 miles 10-12-in.
Sunray Oil Corp.	17	8	Completed	Pipe Line Service Co.—Velma-Beckett, Okla.
Texas Pipe Line Co.	60	16	Planned	West Columbia, Tex.-Houston.
Texas Pipe Line Co.†	90	20	Under way	Morrison Const. Co., Inc.—Jal, N. M.-Midland, Tex.
Texas Pipe Line Co.†	253	22	Under way	Latex Const. Co.—Midland, Tex.-Wichita Falls, Tex.
Texas Pipe Line Co.†	173	24	Planned	Wichita Falls, Tex.-Cushing, Okla.
Texas Pipe Line Co.	90	20	Under way	Latex Const. Co.—Houston, Tex.-Port Arthur, Tex.
Texas Pipe Line Co.	190	12	Planned	Wichita Falls, Tex.-Corsicana, Tex.
Union Oil Co. of California	20	8-10	Planned	Miscellaneous crude and products.

*Ozark Pipe Line System of Shell Pipe Line Corp. and Texas Pipe Line Co. Co., Shell Pipe Line Corp., Empire Pipeline Co., Sinclair Refining Co. †Jal-Cushing Pipe Line System of Texas Pipe Line

Pipe Line, will consist of 435 miles of 22-in. extending to Wood River. A continuation of this 22-in. line to Patoka, Ill., has been discussed with a completion date of March 1, 1949. Pumping capacity would be 186,000 bbl. daily.

At Cushing the capacity of the Jal-Cushing line, in excess of the Ozark line, will be available for delivery into other trunk lines pumping northward from Oklahoma.

The highest concentration of products-pipe-line activity has recently centered in Texas. Following the building of Humble Pipe Line's Baytown-Hearne-Dallas line in 1946, Magnolia Pipe Line, with a Beaumont-Hearne 12-in. line, collaborated with Texas Pipe Line, which completed a 143-mile 10-in. line early this year from Hearne to the Dallas-Fort Worth area.

Sinclair Refining has the largest products-pipe-line-construction program in 1948, following the laying of the Corpus Christi-Austin-San Antonio-Bryan line in 1947. Already this year, Sinclair has completed the 264-mile 10-in. line from Houston to Arlington (near Dallas) and is now laying a 177-mile 8-in. line to Shawnee, Okla., to feed into an 8-in. system converted from crude-oil service which will deliver products this year from Texas into the Kansas City, St. Louis, and Chicago areas.

Biggest Natural-Gas Theater

The biggest theater of natural-gas pipe lines is active for increasing transmission from the Southwest to industrial areas between Milwaukee and Boston, to serve new markets and to meet the rapid increase in demand for natural gas, in this period when the competitive position of this ideal fuel is becoming definitely improved.

A pipe-line boom is under way, involving the present construction of 770 miles of 20-26-in. line to parallel Tennessee Gas Transmission Co.'s 24-in. Corpus Christi, Tex.-Cornwell, W. Va., line built in 1944, which happens to be the first long-distance transmission laid since the big lines were built by several companies out of the Texas Panhandle in 1930 and 1931. The Tennessee company will follow the 26-in. line with a parallel 992-mile 30-in. line and a 790-mile 20-26-in. extension via Buffalo, to Boston. The company is preparing for a 1,000,000,000 cu. ft. daily throughput to be attained with the expenditure of $124,354,000.

Texas Eastern Transmission Co. seeks federal authorization to install additional compressor units to raise

TABLE 2—LARGE DOMESTIC PRODUCTS-LINE PROJECTS

Company—	Miles	Inch	Status	Contractor and location
Connecticut Pipe Line Co.	40	8	Planned	New Haven-Hartford.
Great Lakes Pipe Line Co.	....	..	Completed	12 booster stations.
National Cooperative Refinery Association	25	..	Under way	M. E. White Pipeline Const. Co.—Council Bluffs, Iowa-Irvington, Neb.
Phillips Petroleum Co.	37	6	Completed	Borger-McKee, Tex.
Phillips Petroleum Co. and Shamrock Oil & Gas Co.	152	6	Planned	La Junta to Denver, Colo.
Phillips Petroleum Co. and Shamrock Oil & Gas Co.	99	8	Completed	Deaton & Sons, Vaughn & Taylor—Borger, Tex.-Paola, Kans., loops.
Shell Oil Co., Inc.	....	..	Under way	Increase operating pressure of existing pump stations on East Products Pipe Line.
Shell Oil Co., Inc.	....	..	Completed	Restationing program on North Products Pipe Line.
Sinclair Refining Co.	190	6	Completed	Clinton-Cleveland-Steubenville, Ohio.
Sinclair Refining Co.	225	6	Completed	Corpus Christi-San Antonio-Austin-Bryan, Tex.
Sinclair Refining Co.	264	10	Under way	H. C. Price & Co.—Houston-Fort Worth, Tex.
Sinclair Refining Co.	177	8	Under way	Pacific Pipe Line & Engineers, Ltd.—Fort Worth-Panova Station, Okla.
Sinclair Refining Co.	290	8	Under way	Company crews—Panova, Okla.-Redel, Kans., recondition crude line for products.
Sinclair Refining Co.	270	8	Under way	Company crews—Redel, Kans.-Wood River, Ill., recondition crude line for products.
Sinclair Refining Co.	20	6	Under way	Company crews—Redel, Kans.-Kansas City, recondition for products.
Sinclair Refining Co.	26	8	Planned	Marcus Hook-Philadelphia.
Sinclair Refining Co.	377	8	Planned	Carrollton-East Chicago.
Sinclair Refining Co.	700	8	Planned	Sinclair, Wyo.-Kansas City.
Socony-Vacuum Oil Co., Inc.	127	4-6	Planned	Portland-Bangor, Me.
Socony-Vacuum Oil Co., Inc.	154	8	Under way	Binghamton, N. Y., to Malvern, Pa.
Socony-Vacuum Oil Co., Inc.	57	8	Under way	Spurs at Reading, Allentown, Exeter and Hazleton, Pa.
Sunray Oil Corp.	95	6	Under way	Pipe Line Service Co.—Beckett, Okla., to Allen, Okla.
Texas Pipe Line Co.	143	10	Under way	Associated Contr. & Engrs., Inc.—Hearne-Dallas, Tex.
Texas Pipe Line Co.	26	8	Under way	Associated Contr. & Engrs., Inc.—Dallas-Fort Worth, Tex.
Texas Pipe Line Co.	79	8	Under way	Latex Const. Co.—Hearne-Austin, Tex.
Texas Pipe Line Co.	28	6	Under way	Latex Const. Co.—Austin-San Marcos, Tex.
Triangle Pipe Line Co.	42	8	Completed	Rosston-Richards Co.—Carthage-Larosen, near Shreveport, La.
Union Oil Co. of California	10	6	Planned	Torrance to Rosecrans.
Wyco Pipe Line Co. (Standard of Indiana-Texas Co. and Socony-Vacuum Oil Co., Inc.	267	8	Completed	Pacific Pipe Line & Eng., Ltd., Allred-Enix Const. Co.—Casper, Wyo., to Denver, Colo.

capacity to 508,000,000 cu. ft. daily by January 1, 1949. In planning for the future, consideration has been given to building a 26-in. line to parallel the Big Inch (24-in.) line to the Pittsburgh area, with a 400-mile extension southwest from Longview to Corpus Christi, Tex.

Efforts of Transcontinental to get an FPC permit to build an 1,800-mile 26-in. line from the Rio Grande Valley, Tex., to New York, are currently being opposed by Texas Eastern.

Most recent among the proposals for other lines in this theater of gas-line activity, are the plans of Texas Gas Transmission Co. for an 800-mile 26-in. line from East Texas to Middletown, Ohio.

From the Hugoton area of Texas, Oklahoma, and Kansas, construction is progressing northeastward for the 1,584-mile 18-26-in. natural-gas line of Michigan-Wisconsin Pipe Line Co. to be completed in 1950. Natural Gas Pipeline Co. of America and Texoma Natural Gas Co. are filling in the loops on their line from the Texas Panhandle to Chicago, which will result in solid parallel line to their existing system sometime this year. Looping and additional compressors are increasing capacity of Northern Natural Gas Co. and Panhandle Eastern Pipe Line Co.

Each corner of the United States will be served by large gas lines planned for the next few years. In the Southeast, Atlantic Gulf Gas Co. (affiliated with United Gas Pipe Line Co.) will build a 1,530-mile system into Alabama, Florida, Georgia, and South Carolina; to the extreme Southwest. El Paso Natural Gas Co. will build 601 miles of 26-in. line paralleling the system built last year. Northwest Natural Gas Co. will bring gas from fields in Alberta, Canada, to Vancouver, B. C., Seattle, and Portland.

Middle-East Lines

Big inch pipe of largest dimensions is planned for the sensational crude-oil lines in the Middle East, which include the Trans-Arabian Pipe Line Co. 1,040-mile 30-in. and 31-in. Abqaiq, Saudi Arabia-Sidon, Lebanon line now under construction. Iraq Petroleum Co., Ltd.'s, 1,200-mile 16-in. looping now in progress is to be followed by a 500-mile 30 and 32-in. line from Iraq to a Levantine port. Middle East Pipe Line Co. will lay an 800-mile 34-36-in. line from Iran to a Levantine port, for which fabrication of pipe will start in the second quarter of 1949. A 325-mile 12-22-in. project is being built in Kuwait by Kuwait Oil Co.

Never before has there been such extensive pipe-line construction in South America as is now in progress. Creole Petroleum Co. is laying the 155-mile 26-in. Ule-Amuay and S.A. Petrolera Las Mercedes (Texas Co. and Caracas Petroleum Co.) 157-mile, 16-in. Las Mercedes-Pamatacual, both crude-oil lines in Venezuela. Yacimientos Petroliferos Fiscales Bolivianos is building the 255-mile, 6-in. crude oil line from Camari to Cochabamba, Bolivia. Direccion General del Gas del Estado is laying the 1,100-mile 10-in. Comodoro Rivadavia-Buenos Aires, natural-gas line in Argentina.

It may be observed that large-diameter pipe of increasingly larger dimensions is being used for the trunk lines of both crude-oil and natural-gas pipe lines. This is another big-inch year. Retarded deliveries mean the prolonging of construction periods for individual projects. However, the total volume of pipe-line construction for all projects is high.

In the face of large construction costs and steel shortages, the industry is pushing construction as fast as possible to serve increasing markets by effective utilization of the unique economic advantages of pipe-line transportation.

TABLE 3—PRINCIPAL DOMESTIC NATURAL-GAS PROJECTS

Company—	Miles	Inch	Status	Contractor and location
Arkansas Louisiana Gas Co.	35	6	Planned	Columbia, Arkansas, gas treating plant, lines to Haynesville, La., and Salem Church, Arkansas, fields.
Atlantic Gulf Gas Co. (United Gas P. L. Co.)	1,530	..	Planned	Alabama-Florida-Georgia-South Carolina.
Atlantic Seaboard and Virginia Gas Transmission Co.	269	24	Planned	Clendenin, W. Va.-Rockville, Md.
Cities Service Gas Co.*	183	26	Under way	Ray L. Smith & Sons, Inc.—Ulysses-Hutchinson, Kans.
Cities Service Gas Co.*	50	26	Under way	Midwestern Constructors, Inc.—Ottawa-Olathe, Kans-Martin City, Mo.
Cities Service Gas Co.	15	12	Completed	Company crew—Columbus-Pittsburg, Kans.
Cities Service Gas Co.	47	20	Under way	Company crew—Liberty, Kans.-Carthage, Mo.
Cities Service Gas Co.*	405	26	Under way	Ulysses, Okla.-Kansas City, Mo.
Cities Service Gas Co.	40	20	Planned	Independence, Kans.-Joplin, Mo.
Colorado-Wyoming Gas Co.	100	12-16	Under way	Pacific Pipeline & Engineers, Ltd.—Cheyenne, Wyo.-Denver.
Commonwealth Natural Gas Corp.	537	20	Planned	West Bend, Ky.-Norfolk, Va.
Dow Chemical Co.	55	4-8-12	Under way	Latex Const. Co.—Bay City, Tex., area.
Dow Chemical Co.	44	4-12	Completed	Latex Const. Co.—Citrus Grove and Bay City, Tex., area.
East Ohio Gas Co.	84	20	Under way	Williams Brothers Corp.—St. Clairsville-Akron, Ohio, to connect with Texas Eastern Transmission Corp.
East Tennessee Natural Gas Co.	398	3-16	Planned	Nashville-Chattanooga-Knoxville, Tenn., and lateral lines.
El Paso Natural Gas Co.	189	12-18	Completed	Gathering lines in New Mexico and West Texas.
El Paso Natural Gas Co.	601	26	Planned	Eunice, N. M.-Blythe, Calif., looping.
El Paso Natural Gas Co.	248	24	Planned	Eunice, N. M.-Dumas, Tex., extension.
El Paso Natural Gas Co.	470	26	Planned	San Juan basin, N. M.-Needles, Calif.
El Paso Natural Gas Co.	83	4-16	Planned	Expansion to serve Tucson and Phoenix, Ariz.
El Paso Natural Gas Co.	96	24	Planned	From 45 miles east of Blythe, Calif., to proposed line to Needles, Calif.
Home Gas Co.	61	4-10-12	Planned	Hancock and Dundee, N. Y., lines.
Hope Natural Gas Co.	40	8-14-16	Planned	Pipe Line Const. Co.—Kopperston, Lockney, and Hastings, W. Va.
Manufacturers Light & Heat Co. and Home Gas Co.	118	14	Completed	Williams Brothers Corp.—Coatesville, Pa., to Port Jervis, N. Y.
Manufacturers Light & Heat Co.	4	14	Completed	Williams Brothers Corp.—Port Jervis, N. Y., to Deer Park, N. Y.
Manufacturers Light & Heat Co.	19	10-12-14	Planned	Pittsburgh, Pa., area.
Manufacturers Light & Heat Co.	36	4-10-12	Planned	Storage field lines, Majorsville, Pa.; Donegal, Pa.; Brinker, Ohio.
Michigan Consolidated Gas Co. and Austin Field Pipe Line Co.†	130	24	Under way	J. R. Horrigan Const. Co.—Austin gas-storage field, Big Rapids-Detroit, Mich.
Michigan-Wisconsin Pipe Line Co.†	1,584	18-26	Planned	Hansford, Tex.-Milwaukee, Wis.-Big Rapids, Mich.
Michigan-Wisconsin Pipe Line Co.†	225	24	Under way	J. R. Horrigan Const. Co.—Hansford, Tex., to Hutchinson, Kans. (initial construction of 1,584-mile project).
Mississippi River Fuel Corp.	221		Planned	Loops on Monroe, La.-St. Louis, Mo., line.
Mountain Fuel Supply Co.	35	10	Under way	Salt Lake City to Provo, Utah.
Natural Gas Pipeline Co. of America	36	26	Under way	R. H. Fulton & Co.—Hooker, Okla., to company's main line.
Natural Gas Pipeline Co. of America	27	26	Under way	Midwestern Constructors—Main-line looping, Iowa and Illinois.
Natural Gas Pipeline Co. of America	53	24	Under way	H. C. Price & Co.—Main-line looping, Illinois.
Northern Natural Gas Co.	34	10	Planned	Ames-Marshalltown, Iowa.
Northern Natural Gas Co.	104	4-20	Planned	Hugoton and Panhandle field lines.
Ohio Fuel Gas Co.	43	6-16	Under way	Mahoney Contr. Co.—Wellington storage and Perryville storage, Ohio.
Ohio Fuel Gas Co.	10	8	Under way	Midwestern Const., Inc.—Knox storage, Ohio.
Ohio Fuel Gas Co.	76	10-18	Planned	Lima, Marion, and Benton on storage, Ohio and miscellaneous lines.
Ohio Fuel Gas Co.	88	20	Planned	South Point to Sugar Grove, Ohio.
Oklahoma Natural Gas Co.	72	16	Planned	Twp. 8n, Range 9e to Twp. 4n, Range 2w, Oklahoma.
Oklahoma Natural Gas Co.	31	13	Planned	Twp. 4n, Range 2w to Twp. 1s, Range 5w, Oklahoma.
Oklahoma Natural Gas Co.	36	13	Planned	Twp. 4s, Range 2w to Twp. 5n, Range 8w, Oklahoma.
Pan American Gas Co.	18	16	Under way	Latex Const Co.—Chocolate Bayou to Texas City.
Panhandle Eastern Pipe Line Co.	198	26	Planned	Loop to be laid in 1948.
Panhandle Eastern Pipe Line Co.	169	26	Planned	Loops to be laid in 1949.
Panhandle Eastern Pipe Line Co.	335	26	Planned	Loops to be laid in 1950 and later.
The Rocky Mountain Gas Co.	57	8	Under way	Dawson & Corbett—Medicine Bow, Wyo., to Rawlins, Wyo.
Skelly Oil Co.	25	4-20	Under way	Bishop & Lock Const. Co.—Velma field, Oklahoma.
Southern California Gas Co.	12	30	Planned	Santa Fe Springs-Pasadena, Calif.
Southern California Gas Co.	80	3-4-8	Planned	Desert Center-Calixico, Calif.
Southern California Gas Co.	43	6-8-10	Completed	Trico-Delano-Tipton-Porterville, Calif.
Southern Natural Gas Co.	138	20-22	Planned	Chattanooga, Tenn.-Lexington, Miss.
Southern Natural Gas Co.	375	24	Planned	Gwinville, Miss.-Atlanta, Ga.
Southern Natural Gas Co.	225	16	Planned	Colfax, Ga., extension.
Stanolind Oil & Gas Co.	320	2-30	Under way	Deaton & Sons—Slaughter pool, Texas.
Tennessee Gas Transmission Co.	392	20-26	Completed	Main-line loops.
Tennessee Gas Transmission Co.	524	20-26	Planned	Main-line loops.
Tennessee Gas Transmission Co.	790	20-26	Planned	Burnaugh, Ky.-Boston, including 395-mile line to Buffalo, N. Y.
Tennessee Gas Transmission Co.	992	30	Planned	The first 150 miles of loops to be laid at Monroe, La.; Greenville, Miss.; Midland and Portland, Tenn.

TABLE 3—PRINCIPAL DOMESTIC NATURAL-GAS PROJECTS (Continued)

Company—	Miles	Inch	Status	Contractor and location
Tennessee Gas Transmission Co.	44	16	Planned	Columbiana County, Ohio-Allegheny County, Pa.
Tennessee Gas Transmission Co.	30	16	Planned	Southwest Texas gathering line.
Tennessee Gas Transmission Co.	67	26	Under way	Morrison Bros.—Loop in Tennessee.
Tennessee Gas Transmission Co.	99	16	Completed	Agua Dulce-San Salvador, Tex.
Tennessee Gas Transmission Co.	65	16	Planned	Ohio-Pittsburgh spur.
Tennessee Gas Transmission Co.	87	20	Completed	Carthage, Tex., spur.
Texas Eastern Transmission Corp.	27	6-8-12	Planned	Laterals in Cheltenham, West Conshohocken and Chester, Pa., areas.
Texas Eastern Transmission Corp.	900	26	Planned	Corpus Christi, Tex.-Pittsburgh, Pa.
Texas Gas Transmission Co.	800	26	Planned	East Texas-Middletown, Ohio.
Transcontinental Pipe Line Co.	1,800	26	Planned	Rio Grande Valley, Tex.-New York.
Trunkline Gas Supply Co.	885	30	Planned	Wharton, Tex.-Keokuk, Iowa.
United Fuel Gas Co.	23	24	Under way	Williams Brothers Corp.—Foster, Ky., to Brent, Ky.
United Fuel Gas Co.	10	20	Under way	Williams Brothers Corp.—Kenova, W. Va., to Burlington, Ohio.
United Fuel Gas Co.	32	20	Planned	West Virginia.
United Gas Pipe Line Co.	33	20	Completed	Carthage-Longview, Tex.
United Gas Pipe Line Co.	93	18	Planned	Baxterville, Miss.-Mobile, Ala.
United Gas Pipe Line Co.	41	10-12	Completed	Barataria, La.-New Orleans.
United Gas Pipe Line Co.	14	12	Under way	Associated Contractors & Engrs., Inc.—Soso, Miss., field to Jackson-Mobile 16-in. line.
United Gas Pipe Line Co.	47	12-18	Planned	Looping portion of Latex-Fort Worth existing main line and replacements.
United Gas Pipe Line Co.	25	14	Planned	Baxterville, Miss.-Mobile, Ala.
Warren Petroleum Corp.	60	2-30	Completed	Holland Construction Co.—Antioch-Maysville, Okla., system.

*Ray L. Smith & Sons, Inc. and Midwestern Constructors, Inc., are laying two sections in 1948 totaling 233 miles for Cities Service Gas Co.'s 405-mile, 26-in., Ulysses, Kans.-Kansas City, Mo., line. The remainder will be laid later. †The 225 miles of 24-in. being laid by J. R. Horrigan Construction Co. from Texas is the beginning of Michigan-Wisconsin Pipe Line Co.'s 1,584-mile project scheduled for completion July 1, 1950. The Austin field, Michigan, 130-mile, 24-in. line being laid by Horrigan is to serve the eastern end of the project.

TABLE 4—MAJOR FOREIGN CRUDE-OIL PROJECTS
1948-1955 (announced)

Company—	Miles	Inch	Status	Contractor and location
Anglo-Iranian Oil Co., Ltd.	56	20-22	Planned	Agha Jari-Mashur, Iran.
Arabian American Oil Co.	61	20-22	Under way	Company crews—Abqaiq-Ras Tanura, Saudi Arabia.
Creole Petroleum Co.	155	26	Planned	Williams Brothers Co.—Ule Tank Farm, La Salina-Amuay Bay, Paraguana, Venezuela.
Imperial Oil, Ltd.	500	..	Planned	Edmonton, Alta.-Regina, Sask.-Moose Jaw, Sask., Canada.
Imperial Oil, Ltd.	350	..	Planned	Regina, Sask.-Winnipeg, Man., Canada.
Iraq Petroleum Co., Ltd.	1,200	16	Under way	Company crews—Kirkuk, Iraq-Haifa, Palestine, and Tripoli, Lebanon.
Iraq Petroleum Co., Ltd.	500	30-32	Planned	Iraq-Levantine port.
Kuwait Oil Co. Gulf and Anglo-Iranian	325	12-22	Under way	Kuwait, Arabia.
Middle East Pipe Line Co.	800	34-36	Planned	Iran-Levantine port.
S. A. Petrolera Las Mercedes (Texas Co. and Caracas Petroleum Co.)	157	16	Under way	Williams Brothers Co.—Las Mercedes field-Pamatacual, Venezuela.
Trans-Arabian Pipe Line Co.	1,040	30-31	Under way	Abqaiq-Saudi Arabia-Sidon, Lebanon.
Yacimientos Petroliferos Fiscales Bolivianos	255	6	Under way	Williams Brothers Co.—Camiri - Cochabamba - Sucre, Bolivia.

TABLE 5—LARGE FOREIGN PRODUCTS LINE PROJECTS

Company—	Miles	Inch	Status	Contractor and location
Cie. des Pipe Lines Petroliers Francais	150	10	Planned	Le Havre-Paris, France.
Ministry of Petroleum of Colombia and Antioqua R.R.	107	..	Planned	Puerto Berrio-Medellin, Colombia.
National Petroleum Council of Brazil	30	..	Planned	Santos-Sao Paulo, Brazil.
Svenska Enterprenad Aktiebolget	220	..	Planned	Uddevalla-Vasteras, Sweden.

TABLE 6—PRINCIPAL FOREIGN NATURAL-GAS PROJECTS

Company—	Miles	Inch	Status	Contractor and location
Northwest Natural Gas Co.	600	24	Planned	Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.
Petroleos Mexicanos	150	20	Under way	Williams Brothers Corp.—Posa Rica-Mexico City, Mexico.
Direccion General del Gas del Estado	1,100	10	Under way	Tecnica and government crews—Comodoro Rivadavia-Buenos Aires, Argentina.
U.S.S.R.	360	..	Under way	Dashiva (in Carpathians)-Kiev, Ukraine.
Western Prairie Pipe Line Co.	850	..	Planned	Calgary-Saskatoon, Alta.-Winnipeg, Man.

Projected Natural-Gas Processing Units Rated At Billion-Foot Daily Capacity

CURRENT reports on The Oil and Gas Journal's survey on expansion in the natural-gas-processing industry show that 30 operating companies are either planning, building, or have authorized construction of 57 different projects. These projects, listed in the accompanying table, include a large group of new gasoline plants, several cycling plants, a number of plant-expansion jobs, and a new gas-injection unit.

Of the 31 new natural-gasoline plants listed in the table, 4 are in the planning stage, 8 have been authorized for construction, and 19 are being built.

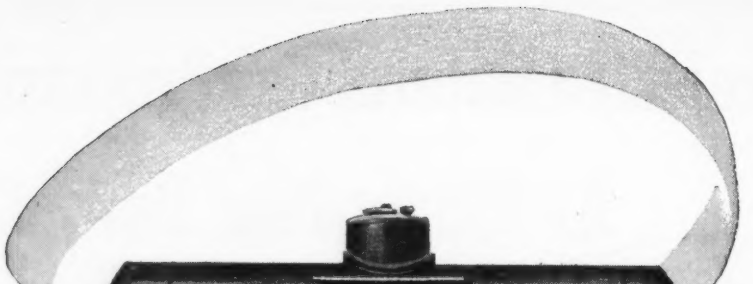
Over Billion Feet Per Day

Input-gas capacity on the "building" plants is well over a billion cubic feet per day. Capacity-rating total on the authorized natural-gasoline plant projects is nearly 600,000,000 cu. ft. per day gas input. No ratings are reported on the four planned plants but an estimate on their probable capacity shows a gas input of nearly one-half billion cubic feet per day.

Reports on expansion of cycling plants show that four new units are being built at this time. All of these units are located in Texas and have a combined gas-input capacity rating of 410,000,000 cu. ft. per day. Scheduled completion date on two of the new cycling plants is set for early next year whereas the other two are nearing completion now.

NATURAL-GASOLINE AND CYCLING-PLANT CONSTRUCTION

Company, location and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Abercrombie Co., J. S., Old Ocean field, Texas:				
Revamp existing facilities	.....	Planned	1948	.....
American Republics Corp., Hardin County, Texas:				
Gasoline plant, cu. ft. per day	58,500,000	Building	Sept. '48	Gasoline Plant Const. Corp.
Arkansas Fuel Oil Co., Panola, Tex.:				
Gasoline plant, cu. ft. per day	100,000,000	Building	Sept. '48	.....
Arkla Oil Co., North Rodessa field, Arkansas:				
Installing engines, hp.	2,000	Building	.....	.....
Barnsdall Oil Co., West Tepetate field, Louisiana:				
Gasoline plant, cu. ft. per day	20,000,000	Building	Mid '48	Dresser Engineering Co.
California Co., The, Hico, La.:				
Gasoline plant	.....	Building	.....	.....
California Co., The, Brookhaven, Miss.:				
Gasoline plant, cu. ft. per day	10,000,000	Building	.....	.....
California Co., The, Rangely, Colo.:				
Gasoline plant, cu. ft. per day	20,000,000	Building	.....	.....
Claiborne Gasoline Co., Lisbon, La.:				
Gasoline-plant addition, cu. ft. per day	50,000,000	Building	Late '48	Petroleum Engineering, Inc.
Gray-Wolfe Co., The, Montgomery County, Texas:				
Cycling plant, cu. ft. per day	19,000,000	Building	Early '48	O. L. Olsen
Gregg-Tex Gasoline Corp., Gregg County, Texas:				
Additional facilities for propane extraction	.....	Building	Mid '48	.....
Gulf Oil Corp., Drinkard, N. M.:				
Gasoline plant, cu. ft. per day	50,000,000	Building	Late '48	Hudson Engineering Co.
Harrington & Marsh, Texas County, Oklahoma:				
Gasoline plant, cu. ft. per day	100,000,000	Building	Mid '48	J. F. Prichard & Co.
Humble Oil & Refining Co., Katy, Tex.:				
Cycling plant expansion, cu. ft. per day	500,000,000	Building	May '49	Stearns-Roger Mfg. Co.
Humble Oil & Refining Co., Overton, Tex.:				
Gasoline plant expansion, cu. ft. per day	16,000,000	Building	June '48	Fish Engineering Corp.
Revamping gasoline plant, cu. ft. per day	9,500,000	Building	July '48	Fish Engineering Corp.
Humble Oil & Refining Co., Laird Hill, Tex.:				
Altering gasoline plant, cu. ft. per day	7,000,000	Building	Aug. '48	Fish Engineering Corp.
Lion Oil Co., Magnolia field, Arkansas:				
Increasing treating capacity, cu. ft. per day	2,000,000	Planned	.....	.....
Lion Oil Co.:				
Propane-recovery unit, gal. per day	1,200	Building	Mid '48	O. L. Olsen
Extend compressor plant, hp.	600	Building	Mid '48	O. L. Olsen
Lone Star Producing Co., Henderson County, Texas:				
Gasoline plant expansion, gal. per day	20,000	Building	Sept. '48	.....
Magnolia Petroleum Co., Seeligson field, Texas:				
Cycling plant, cu. ft. per day	220,000,000	Building	Early '49	.....
Magnolia Petroleum Co., Mamou, La.:				
Gasoline plant, cu. ft. per day	7,000,000	Building	Nov. '48	Gasoline Plant Const. Corp.
Magnolia Petroleum Co., Hicock, Kans.:				
Gasoline plant, cu. ft. per day	75,000,000	Building	Nov. '48	.....
Mid-Continent Petroleum Corp., Okfuskee County, Oklahoma:				
Gasoline plant, gal. per day	10,000	Authorized	1948	.....
Pan American Producing Co., Kountze, Tex.:				
Cycling plant, cu. ft. per day	5,000,000	Building	Early '48	O. L. Olsen
Phillips Petroleum Co., Guymon, Okla.:				
Gasoline plant, cu. ft. per day	173,000,000	Authorized	Mid '49	.....
Phillips Petroleum Co., Alvin, Tex.:				
Gasoline plant, cu. ft. per day	120,000,000	Authorized	Late '49	.....
Phillips Petroleum Co., Dumas, Tex.:				
Gasoline plant, cu. ft. per day	55,000,000	Building	Sept. '48	.....
Phillips Petroleum Co., Goldsmith, Tex.:				
Gasoline plant expansion, cu. ft. per day	48,000,000	Building	Nov. '48	.....



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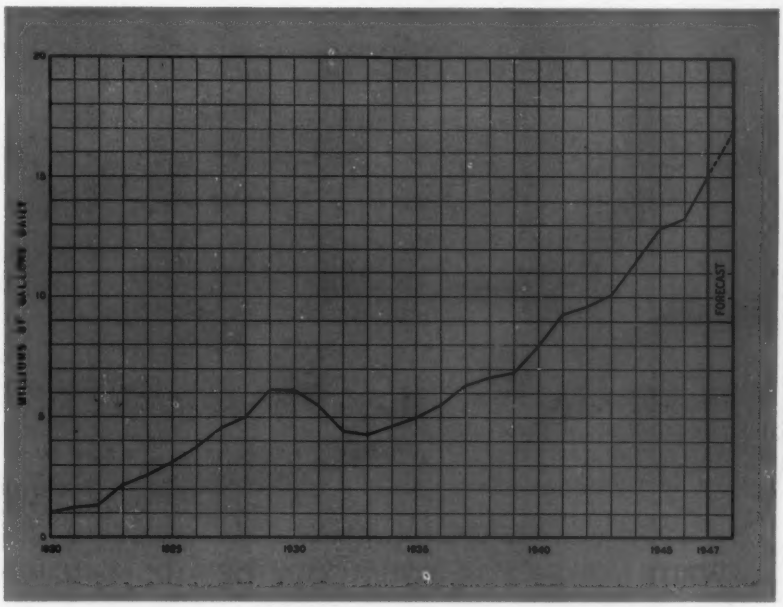
NATURAL-GASOLINE AND CYCLING-PLANT CONSTRUCTION (Continued)

Company, location and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Phillips Petroleum Co., Andrews, Tex.:				
Gasoline plant extension, cu. ft. per day	16,000,000	Building	Early '48	.....
Phillips Petroleum Co., Oil Center, N. M.:				
Gasoline plant extension, cu. ft. per day	16,000,000	Building	Oct. '48	.....
Richardson & Bass, Kermit, Tex.:				
Gasoline plant, cu. ft. per day	130,000,000	Building	Late '48	Jones & Laughlin Supply Co.
Richfield Oil Corp., Kern County, Calif.:				
Gasoline plant, cu. ft. per day	60,000,000	Building	Early '48	C. F. Braun Co.
Shamrock Oil & Gas Corp., The, Sunray, Tex.:				
Gasoline plant expansion, cu. ft. per day	50,000,000	Planned	1948	.....
Shell Oil Co., Inc., Denver City, Tex.:				
Gasoline plant	.....	Planned	.....	.....
Shell Oil Co., Inc., Ventura, Calif.:				
Gasoline plant increase, gal. per day	60,000	Authorized	1948	.....
Skelly Oil Co., Velma pool, Oklahoma:				
Gasoline plant, gal. per day	75,000	Building	Mid '48	Born Engineering Co.
Skelly Oil Co., Eunice, N. M.:				
Gasoline plant increase, gal. per day	60,000	Building	Early '48	J. E. Carlson & Sons Const. Co.
Stanolind Oil & Gas Co., Hugoton field, Kansas:				
Gasoline plant, cu. ft. per day	100,000,000	Authorized	Late '48	Jones & Laughlin Supply Co.
Stanoland Oil & Gas Co., Hockley County, Texas:				
Gasoline plant, cu. ft. per day	90,000,000	Building	Feb. '49	C. F. Braun Co.
Stanolind Oil & Gas Co., Parks County, Wyoming:				
Gasoline plant, cu. ft. per day	12,000,000	Building	Apr. '49	Stone & Webster Engr. Corp.
Stanolind Oil & Gas Co., Bee County, Tex.:				
Cycling plant, cu. ft. per day	166,000,000	Building	Apr. '49	Jones & Laughlin Supply Co.
Stanolind Oil & Gas Co., Levelland field, Texas:				
Gasoline plant, cu. ft. per day	65,000,000	Authorized	1949	.....
Stanolind Oil & Gas Co., Fullerton field, Texas:				
Gasoline plant	.....	Planned	.....	.....
Stanolind Oil & Gas Co., North Cowden field, Texas:				
Gasoline plant	.....	Planned	.....	.....
Stanolind Oil & Gas Co., South Cowden field, Texas:				
Gasoline plant	.....	Planned	.....	.....
Sun Oil Co., Delhi, La.:				
Gasoline plant, cu. ft. per day	17,000,000	Building	Early '48	Petroleum Engineering Co.
Union Oil Co. of California, Cat Canyon field, California:				
Gas injection plant increase, cu. ft. per day	3,000,000	Authorized	Sept. '48	.....
United Gas Pipe Line Co., Carthage, Tex.:				
Gasoline plant, cu. ft. per day	100,000,000	Building	Mid '49	Hudson Engineering Co.
Warren Petroleum Corp., Madill, Okla.:				
Propane unit, gal. per day	20,000	Contracted	Early '49	Hudson Engineering Co.
Warren Petroleum Corp., Holliday, Tex.:				
Gasoline plant expansion, gal. per day	20,000	Building	Mid '48	.....
Warren Petroleum Corp., Taylor's Corner, Tex.:				
Gasoline plant, gal. per day	30,000	Authorized	Early '49	.....
Warren Petroleum Corp., Jacksboro, Tex.:				
Gasoline plant, gal. per day	20,000	Authorized	Early '49	.....
Warren Petroleum Corp., Monument, N. M.:				
Gasoline plant, gal. per day	50,000	Building	Sept.'48	Dresser Engineering Co.
West Edmond Hunton Lime Unit, West Edmond, field, Oklahoma:				
Pressure-maintenance pilot unit, cu. ft. per day	10,000,000	Building	Mid '48	O. L. Olsen
Witco Hydrocarbon Corp., Reagan County, Texas:				
Gasoline plant, cu. ft. per day	25,000,000	Building	July '48	.....

A 3-million - cubic - feet-per - day gas-injection project is reported to be authorized for construction in California. Another gas-injection unit, a pressure-maintenance installation, is now building in West Edmond field, Oklahoma. Completion on this plant, a 10-million-cubic-feet-per-day unit, is scheduled for near the middle of this year.

Modernization and expansion of existing facilities are reported on 20 plants. Three of these projects involve installation of additional facilities for propane extraction. The equipment in 16 gasoline plants is being augmented for over-all capacity increase, according to survey returns. One cycling plant is being expanded by the addition of new equipment. Scheduled for completion soon, this plant is rated at 500,000,000 cu. ft. per day on natural-gas input after expansion of its facilities.

All of these 57 projects are reported to the Journal by operating companies throughout the nation.



McGOWAN PUMPS

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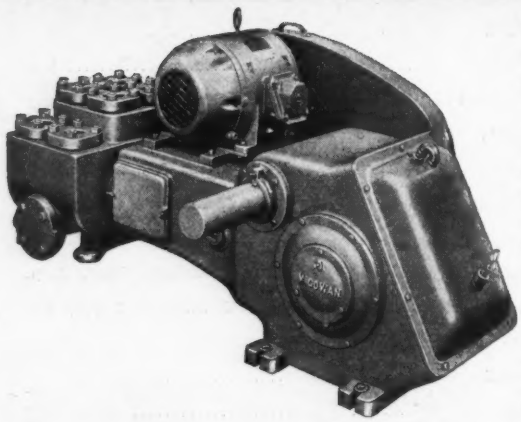

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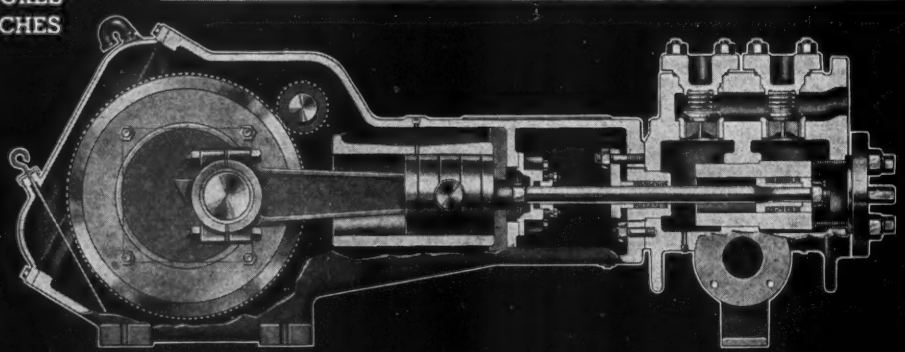
Our Engineering Department is not restricted in its choice of metallurgists and has an unlimited selection for foundries specializing in various casting methods in the alloys which we use. While we have attempted to design our equipment with the best features possible that will suit the large majority of users, we recognize the fact that some engineers lean toward other methods, and while our designs may differ in a few small details we will be glad to construct pumps to meet their specifications.

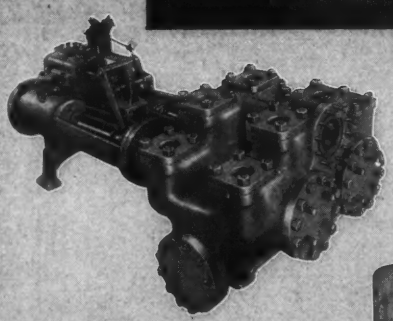
6, 10, 12, INCH STROKES
LINERS 2½ — 9 INCHES

PIPELINES

GATHERING
LINES

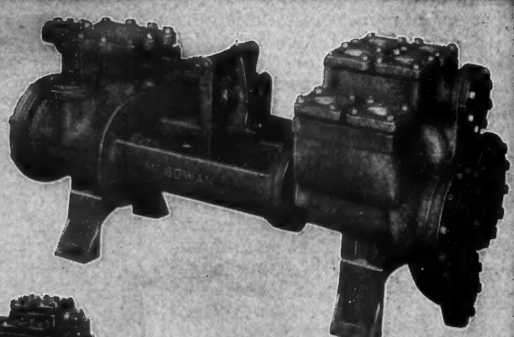
WATER
SERVICE

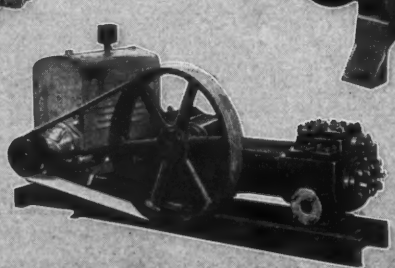




HOT
OIL PUMPS

SIDE POT PUMPS
6, 10, 12, 18
INCH STROKES





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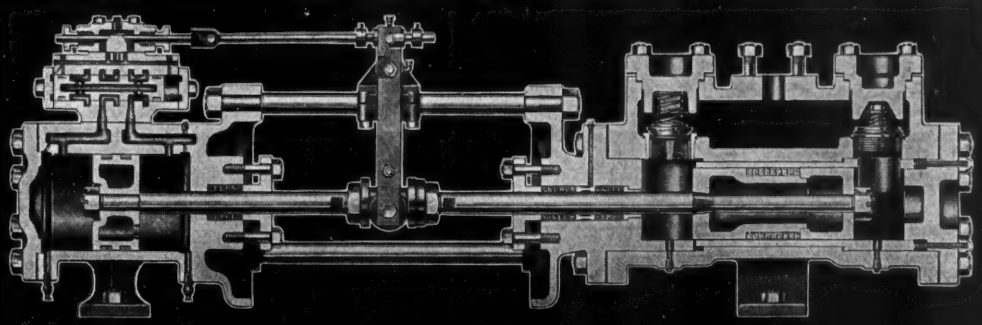
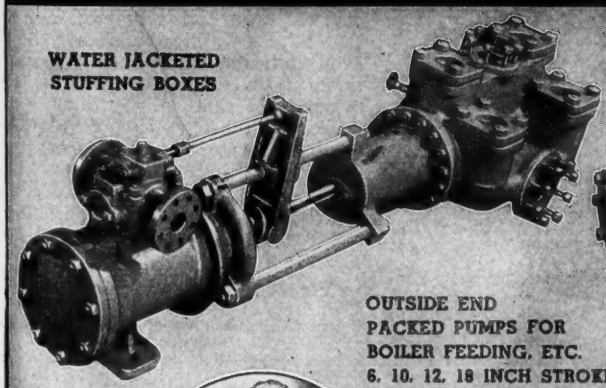
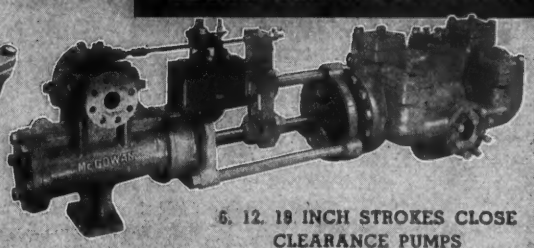


CLOSE CLEARANCE PUMPS

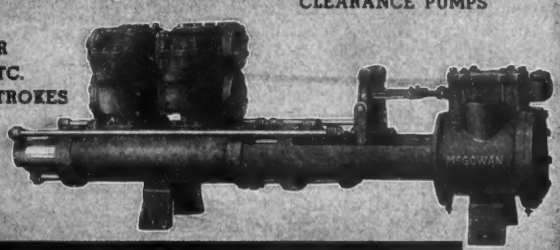
WATER JACKETED STUFFING BOXES





6, 12, 18 INCH STROKES CLOSE CLEARANCE PUMPS

OUTSIDE END PACKED PUMPS FOR BOILER FEEDING, ETC. 6, 10, 12, 18 INCH STROKES



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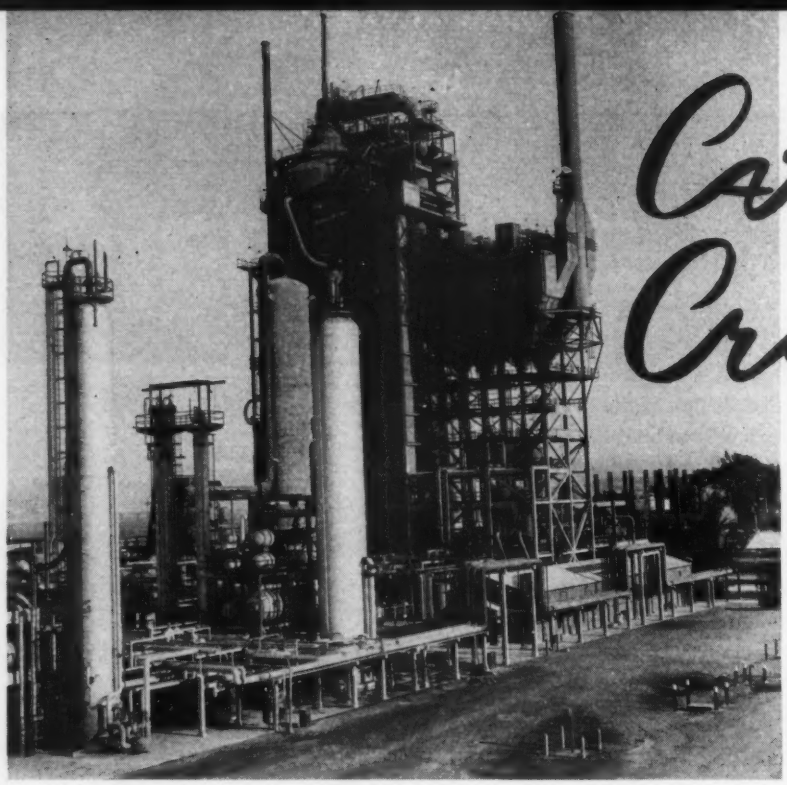

Catalytic Cracking of Heavy Distillate

Avon fluid catalytic cracking unit

by C. H. Viland and James Seth

IN discussing catalytic cracking of unusually heavy stocks at the Avon, Calif., refinery of Tide Water Associated Oil Co., it should be borne in mind that the processing unit was constructed primarily for the wartime production of aviation gasoline.

However, charging stock was a factor receiving much consideration at the time catalytic cracking was being planned. Then-current wartime demands required continued production of high-cetane diesel fuels so that maximum use of heavier distillates for charge stock was imperative. Forecasted peacetime operations allowed even less light gas oil for cracking purposes.

Exploring further the matter of available feed stocks, operating experience and laboratory work indicated that heavy and waxy cracking stock could be obtained by vacuum distillation of available nongasoline-bearing crude oils and also residuum from light crude as normally processed. Properties of this raw cracking material as later produced commercially in the feed preparation facilities are as shown in Table 1.

The main advantage of this heavy charge stock is an economic one. In most catalytic-cracking applications, the charge stock is a relatively valuable middle-of-the-barrel stock which is upgraded in part to gasoline. In the operation under discussion, the heavy-gas-oil portion of residuum is upgraded in part to gasoline and in part to a considerably lighter gas oil product.

While using heavy charge stock involves some economic advantages, it carries penalties from a higher sulfur, nitrogen, and naphthenic acid content than lighter gas oils from the same crudes. Consequently, coke laydown during catalytic cracking is somewhat higher. For this reason, the Avon unit was constructed with a very large carbon-burning capacity. The regenerator has an effective diameter of 46 ft., and the blower a capacity of 63,000 cu. ft. of air per minute at a discharge pressure of 15 psig.

At the time the Avon unit was being designed, there was insufficient operating experience to predict accurately corrosion from feed stocks. From knowledge of thermal cracking, it was thought the sulfur content of the feed stock would cause it to be quite corrosive to equipment. The reactor was therefore lined with 11-13 per cent chrome steel alloy, as was also the lower half of the main fractionator. Operating experience, however, indicates carbon steel is relatively resistant to corrosion in the presence of catalyst.

Heavy California feed stock requires the use of large amounts of catalyst to maintain a desirable yield structure. It is generally conceded this may be due to a catalyst "poisoning" effect resulting from nitrogen, sulfur,

THE AUTHORS

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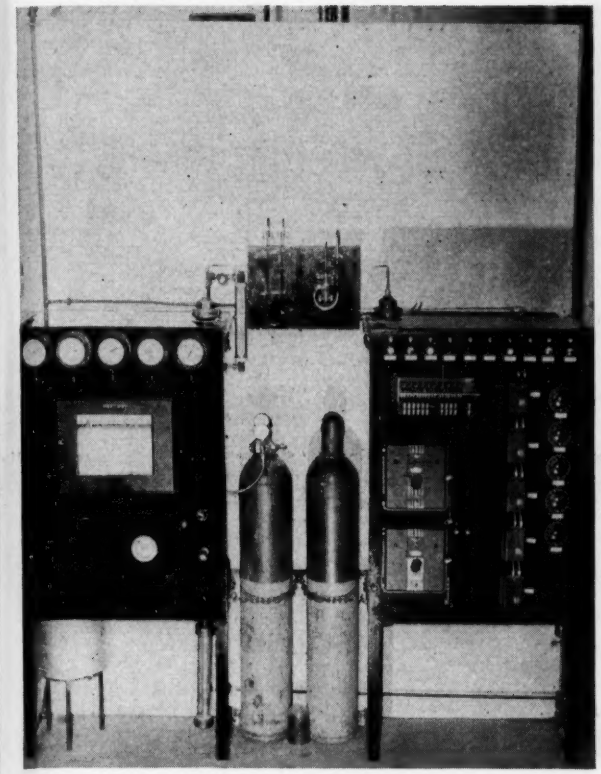
C. K. Viland is general supervisor of research and development for the western division of Tide Water Associated Oil Co., and is located at the Avon, Calif., refinery. He has been with the company since 1929, and is a graduate of Colorado School of Mines with a degree in petroleum engineering.

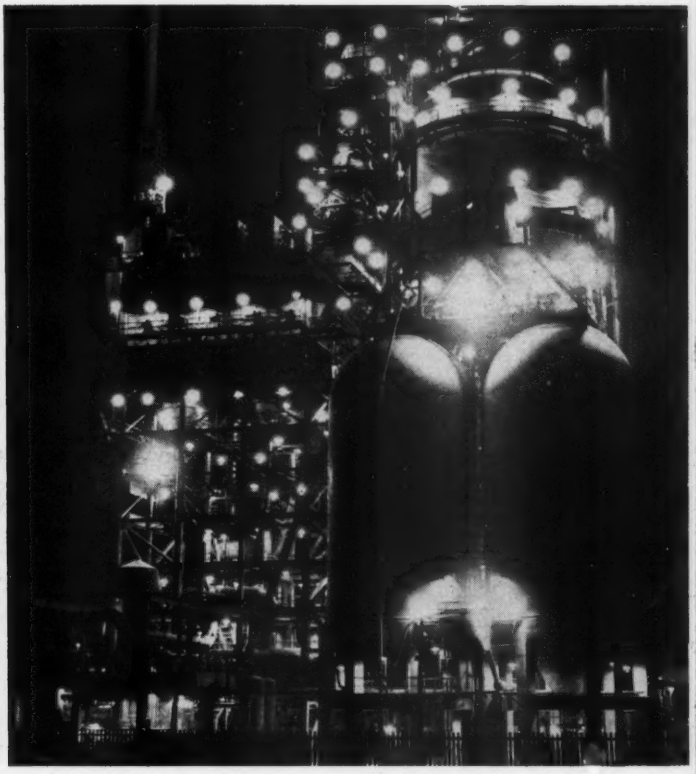
James Seth is a research administrator in the research and development department at Avon, and has been with the company since 1936. He is a graduate of Stanford University and Massachusetts Institute of Technology, with an M.S. degree from M.I.T. in chemical-engineering practice.

TABLE 1
FEED-STOCK CHARACTERISTICS

Source: Vacuum distillate from California crudes

	Normal range
Gravity, °A.P.I.	21-24
Distillation, °F.:	
I.b.p.	400-420
10 per cent	620-650
50 per cent	760-790
90 per cent	880-910
Viscosity, S.S.U. at 100° F.	100-200
Aniline point, °F.	155-165
Pour point, °F.	60-80
Conradson carbon, per cent	0.1-0.2
Sulfur, per cent	0.60-0.80
Nitrogen, per cent	0.25-0.30





Left: Laboratory unit for feed stock studies. Right: Night view of Avon fluid catalytic cracking plant

organic acids and possibly traces of metallic salts present in these oils. At Avon it has been found economically desirable to maintain an over-all catalyst usage of about 1 lb. of Filtrol natural catalyst per barrel of oil charged under present conditions.

TABLE 2—TYPICAL MONTHLY AVERAGE YIELDS

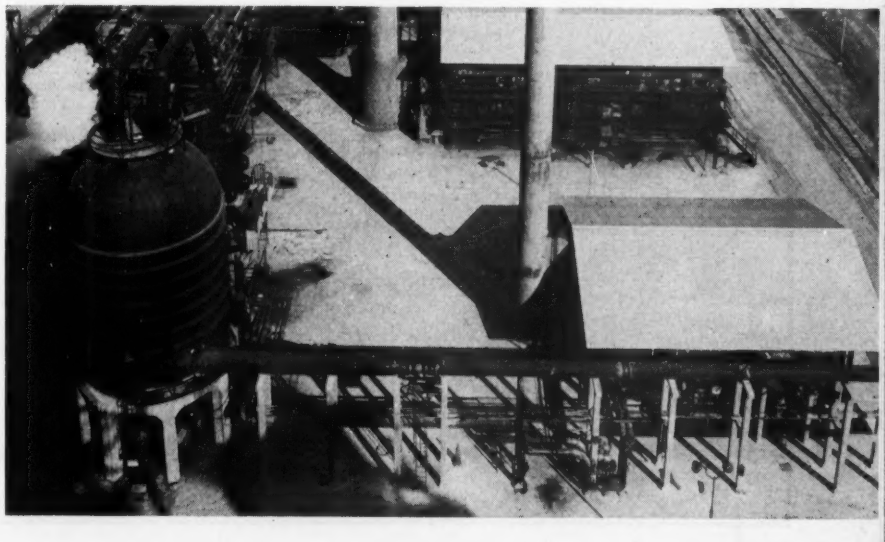
Feed stock:	
Gravity of fresh feed, °A.P.I.	22.9
Operating conditions:	
Oil preheat temperature, °F.	488
Reactor temperature, °F.	936
Reactor pressure, psig.	9.4
Catalyst-oil ratio	12-1
Catalyst level in reactor	None
Estimated weight hourly space velocity, based on catalyst in riser and inlet cone	10.5
Stripping steam, lb. per lb. catalyst circulated	.009
Injection steam, lb. per lb. catalyst circulated	.0009
Catalyst activity, U.O.P. weight	25-28
Carbon on regenerated catalyst	0.44
Type of catalyst	Filtrol
Regenerator temperature, °F.	1,069
Regenerator pressure, psig.	1.1
Oxygen content of flue gas, mol. per cent	1.1
Ratio CO_2 to CO in flue gas	2.2

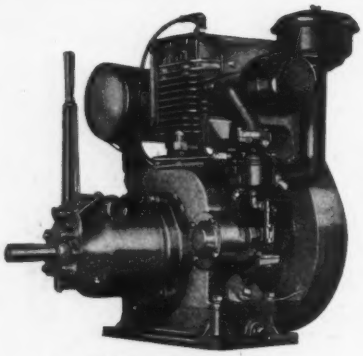
	Per cent—Volume	Per cent—Weight
Yields:		
Absorber residue gas	...	5.0
H_2S product	...	0.1
Propane-propylene	4.0	...
Butanes-butylenes	6.0	...
Catalytic gasoline, butane free	32.1	...
Catalytic gas oil, light	11.0	...
Catalytic gas oil, intermediate	16.8	...
Catalytic gas oil, heavy	28.1	...
Coke deposit	...	6.1

Types of Catalysts

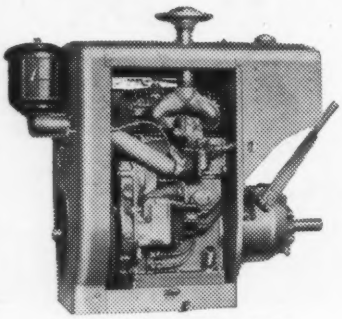
There are two general classes of cracking catalyst in commercial use today, a treated natural clay and a synthetic material of similar chemical composition. Both have been used at Avon. Wartime operation on the unit was entirely on synthetic catalyst after a short breakin run on natural catalyst. Since the end of hostilities in 1945, the catalyst additions have been made entirely with Filtrol natural catalyst. In achieving a given gasoline yield from heavy feed, it is believed a somewhat smaller addition rate of synthetic alumina-silica as compared to natural catalyst would accomplish the same results. However, precise comparative data are not available as wartime operations for aviation gasoline utilized an average gas-oil charge which was considerably lighter than at present and also during certain

Avon feed-preparation unit





MODEL AEH AND AHH
EQUIPPED WITH CLUTCH



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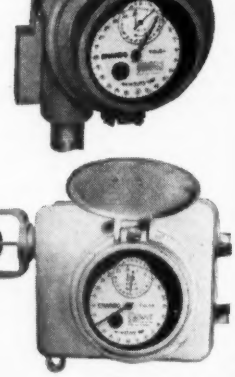

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periods included some thermally reformed gasoline fractions.

The necessity to process heavy feed stock was the prime reason for selecting the fluid process of catalytic cracking.

Table 2 shows typical operating conditions and yield structure for the Avon unit when operating on currently available stocks.

Table 3 shows properties of the

TABLE 3—PROPERTIES OF CATALYTIC GAS OILS

	Light	Inter-mediate	Heavy
Gravity, °A.P.I.	25.9	22.2	19.4
Distillation, °F.:			
I.b.p.	426	510	...
10 per cent	454	554	...
50 per cent	478	602	...
90 per cent	532	662	...
End point	604	715	...

catalytic gas oil streams. It will be noted a substantial amount of the heavy gas oil has been broken down into lighter fuel oil distillates.

For the past 2 years, operations of the Avon fluid unit have been on heavy California vacuum distillate exclusively. With such feed stock, cracking reactions are more rapid than with lighter and more refractory stocks, and it has been noted that high reactor space velocities have been required accompanied by extremely low reactor bed levels. A normal condition was to have some 30 tons of catalyst in the cracking zone above the inlet grid and perhaps 180 tons of catalyst in the stripping section below the grid.

It was postulated that this condition might be conducive of undesirable circulation of catalyst between the cracking and stripping zones, so that cracking was being accomplished largely with spent catalyst on which coke had been deposited, lowering its activity. Furthermore, uncontrolled cracking was undoubtedly taking place in the stripping section.

Low-Level Operation

In view of the foregoing, it was decided to try an experiment wherein the catalyst level would be controlled at a low point in the stripper, thereby preventing any recirculation of catalyst. Cracking would then take place only in the reactor riser, the inlet cone below the distributor grid, and in the dilute phase as the catalyst falls in the stripper. It is estimated some 10-12 tons of catalyst would be present in such cracking zone at any given instant, and perhaps 50 tons in the stripping section.

A striking improvement in yield structure was noted as soon as this process change was made. The change was accomplished with the unit on stream simply by connecting the reactor level control instrument to available pressure taps in the bottom of the stripping section.

Test runs and operating records have demonstrated that the "low level" operation resulted in decreased coke and gas yields for a given level of conversion. By keeping the plant coke-burning rate constant, it was therefore possible to obtain a substantial increase in gasoline production. The decreased coke and gas yields also resulted in an appreciably higher yield of liquid products.

Another benefit from this operation on heavy feed stock has been a substantial decrease in the unit operating inventory of catalyst. In continuing the average catalyst replacement rate, there resulted a substantial increase in activity. This is probably because a given addition rate of fresh catalyst represents a larger percentage of the total amount in the unit. The low level operation has been standard practice at Avon for the past 6 months. Its effect on coke yields are as follows, based on several tests comparing previous normal practice and the new low level operation:

	July tests	Sept. tests
Decrease in coke, wt. per cent of feed	0.6	0.4-0.5
Percentage decrease	7.1	5.6-7.0
Level of catalyst activity (U.O.P. wt.)	19.0	22

A recent test at Avon will be of interest to other fluid-unit operators charging either heavy or light feed stocks. It has been found that with long-time operation of the unit, the percentage of fines in the catalyst in the system tends to decrease. This is caused by the fact that particles passed by the Cottrell precipitator are largely fines.

At Avon the gradual change in particle-size distribution eventually showed up in a somewhat uneven flow of catalyst in the lines. Carryover from the regenerator catalyst bed increased and the load on the cyclones and the cottrell precipitator simultaneously became greater. This has been corrected by the recent addition of a substantial portion of the catalyst as a special fine-grind material. Such catalyst is purchased from Filtrol Corp. and is a material comprising largely 0-20 micron particles. By using 50 per cent of this fine material and 50 per cent regular Filtrol catalyst over a period of several months, the 0-20 micron fines have been built up from a figure of less than 5 per cent to about 20 per cent of the operating inventory. It has been found that with such fines content the stack losses of catalyst have been reduced markedly and are now less than half the former figure.

After the fines were added, catalyst flow was found to be very smooth, and it must be presumed a certain amount of very small particles are important to complete the fluidization of powdered catalyst. Good fluidization is probably more important in the earlier units than in some of the more recent designs having short catalyst lines.

A substantial decrease in apparent bulk density of the catalyst resulted in a further decrease in operating inventory so that when maintaining a constant addition rate of fresh catalyst, there was a second increase in average catalyst activity. Whereas the former operating inventory was usually in the order of 800 tons, the current inventory resulting from the combination of finer grind catalyst and the low level operation is now less than 600 tons.

Useful Laboratory Unit

In order to increase available knowledge of the controllable variables of heavy feed stocks, the research and development department has recently constructed and is now operating an interesting small laboratory catalytic cracking unit capable of fully automatic operation. This research tool permits a new approach in evaluation of catalysts as well as feed stocks.

The laboratory unit is basically similar to an automatic catalyst-aging unit described during the twenty-seventh annual meeting of the American Petroleum Institute by Rice and Ivey. Special attention to the reactor design and the instrumentation has permitted operation on extremely heavy California vacuum distillates such as normally processed in the Avon fluid catalytic cracking unit. Regular fluid catalyst is pelleted for the test without the addition of any binder.

The laboratory unit receives operating attention during the day shift only. Automatic shutdown devices and alarms permit unattended night operation. Each test is conducted over a sufficient time, such as 20 days, to establish the changes in yield structure reflected by the daily decline in activity of catalyst with use on a given feed stock or fraction thereof. Forty-eight cycles of cracking and regeneration are completed each 24 hours the unit is in operation.

A bench-scale fluid-flow unit is also being constructed to supplement the automatic fixed-bed unit. It is anticipated this laboratory equipment will provide additional data on the controllable variables of the commercially available feed stocks.

As of this writing, the Avon fluid unit has been on stream continuously well over 500 days since its last turnaround which was completed in October 1946. The previous run was of 415 days' duration.

The smooth operation and long runs experienced at Avon show that catalytic cracking of extremely heavy distillate charging stocks are entirely feasible, safe, and economically desirable.

The oil and gas industries—exploration, drilling, production, pipe lines, and refining—collectively are today's single largest commercial users of airplanes of the airlines themselves

by Carl Hoot

Airplanes Prove Worth in Expediting Movement of Equipment and Personnel

USE of aircraft in oil-industry operations is not new, but neither is it relatively extensive. Postwar aviation for company salesmen and officials started with a boom, that nearly died with its own echo. At this time there is a decided upturn, and with firmer footing.

Lack of some airport facilities dampened the spirit of many private flyers, and some oil men who did their own piloting. However, oil men place a high value on the airplane's utility and, to a great extent, disregard drawbacks sometimes encountered in flying from point "A" to point 'B," when the latter may be more or less "uncharted."

Today's planes, with increased range, ruggedness, and flying comfort will force ground facilities to meet their pace. Some producing and drilling companies are making their own landing facilities—they find it adds little to total rigging-up expense to bulldoze in a landing strip when making well locations in new areas. The over-all picture of aircraft in the oil industry is enhanced by the enthusiasm of those now operating their own planes, who predict extensive expansion of the field when management is educated to the advantages of making aircraft a regular component of company transportation.

A canvass of oil operators using airplanes, and those contemplating the addition of aircraft to company transportation, reflects their prime requisite as speed. Interpolation of the term, in an industry that is probably the most competitive and high-geared in the world today, simply means more work days available for supervisory personnel.

Planes Aid Supervision

As one construction-company official expressed it, we need supervision everywhere at once, and a means of transportation readily available is an asset of intangible value. In this connection, it was found that once an organization made use of aircraft, its operating cost was generally disregarded, in favor of its utility. Pipeline men have noted a speedup in

construction, for reason that supervisors may, and do, drop in on construction gangs at any time, via airplane. Pipe liners have no aversion toward using right-of-way for landing strips.

In addition to bringing scattered operations within reach of the flying supervisor, it has been pointed out that often a change in construction methods, determined by the supervisor upon his visit to the line gang, or the solving of a construction problem, might easily affect subsequent construction to the extent of paying the cost of a plane in that one trip. Or the change in construction methods might affect a daily or weekly saving from there on, that would be difficult to figure on a dollar basis, if one were trying to evaluate flying equipment on a cost basis only.

A factor of no small importance is prestige of ownership, of one plane or a fleet of planes, and the role of public relations it plays. Customers trips into Mexico for hunting and fishing, from all points in Texas, are commonplace. The popular four-place planes now available offer ample baggage capacity, with nonstop ranges of around 500 miles, at 150 m.p.h., or better. Also, it is no secret that companies find a plane can be very instrumental in monopolizing the time of visiting "V.I.P." who have limited time to conduct their business.

While it is thought by some that aircraft must be used continuously to pay its way, the accompanying chart, prepared from manufacturer's data, gives the airplane a justifiable mileage rate at the relatively low flying time of 100 hours per year, and competitive rates with other forms of transportation as the flying time per year mounts. Optimum operating cost is reached near the 1,000-hour period, when total cost per seat-mile comes down to 1¼ cents, and total hourly cost is approximately $7.44.

Upper view shows Magnolia officials inspecting company's twin-engine plane. Left to right: S. A. Thompson, vice president and manager of exploration; J. L. Latimer, president; Wallace Hawkins, vice president and general counsel; E. D. Smith, vice president and manager of production (retail); L. H. True, vice president, Magnolia Pipe Line Co.; and R. M. Chan, vice president, Magnolia Petroleum Co.

Lower: C. B. McMahan of Monroe, La., is one of the early introducers of pipe line patrol flying—1931. His firm is now flying patrols in an area from the Gulf Coast to the eastern seaboard

The aerial observer is not handicapped in his rounds by spring floods. Special runs of the regular patrol after heavy rains furnished a prompt report on this washed-out and partially floating pipe line

All cost data presented here are based on a single-engine craft, at purchase price of $8,750. Hull amortization is on a 5-year period, with 20 per cent residual value, and engine depreciation based on 4,000 hours flying time. Direct operating cost, not charted, includes gasoline consumption of 10½ gal. per hour at 26½ cents per gallon; oil at 1 qt. per hour, plus 25-hour changes at 35 cents per quart. Maintenance includes all repairs, parts, inspections and overhauls, for an average of $2.19 per flying hour. Maintenance also includes a 50-hour inspection at $37, 100-hour inspection at $75 and 600-hour engine overhaul at $420. Total direct operating cost is calculated at the rate of $5.46 per flying hour, or 3⅞ cents per mile, based on an average block-to-block time of 140 m.p.h.

The fixed-cost graph includes depreciation, average hanger and tie-down fees of $300 per year, and $125

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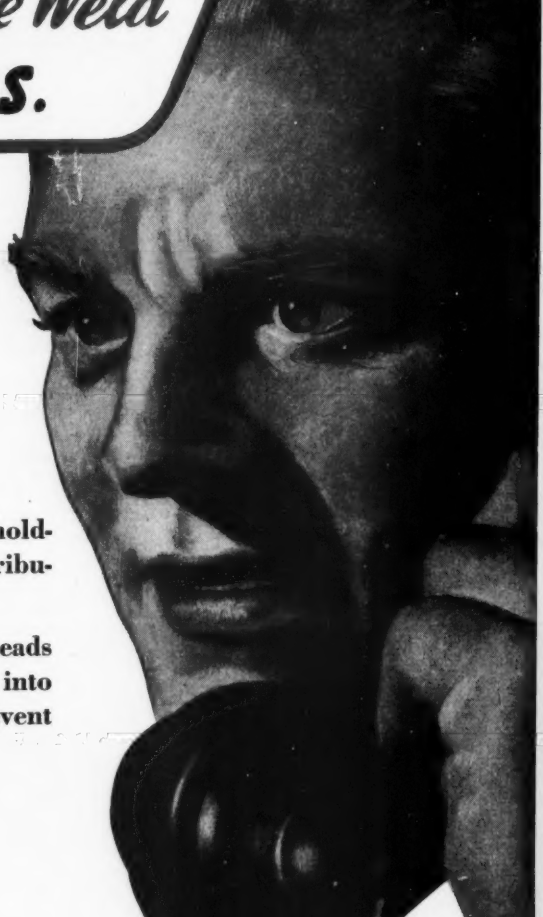

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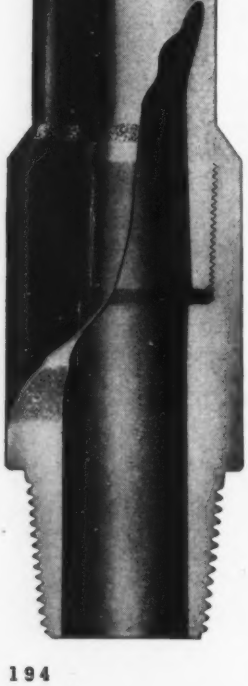

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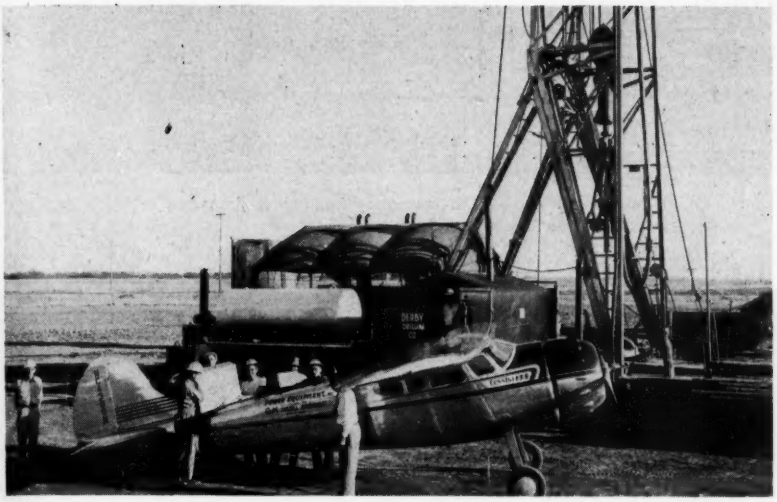


This plane is making an equipment delivery to a Kansas drilling operation

insurance covering public and passenger liability, and property damage.

No attempt was made to itemize expenses incurred in twin-engine operation. However, Premier Oil Refining Co. reports average operating cost of its twin-engine Beechcraft at $50 per hour, or 9 cents per passenger mile. Planes of this size are popular with a number of companies, and from a survey of those companies, it was found that time in transit saved on executive personnel entered into the picture to such an extent that no attempt was made to justify the airplane's use on an operating cost basis. It was also found that company activities in most cases are so coordinated that flights by the larger planes are made with capacity loads.

Pipe-Line Patrols

One of the most useful phases of work by the airplane for the petroleum industry is the patrolling of oil and gas pipe lines. Most of this is done on contract, and according to companies using this method of observation, there is an actual saving in cost per mile over the pipe-line walker, plus a number of advantages claimed by the aerial observers.

Prime advantage of aerial observation is known to be preventive, rather than the location of fully developed leaks. Flying pipe-line patrols now cover as much as 2,000 miles of rugged terrain each week, where formerly the pipe-line walker might average 10 to 12 miles per day over the same route. Under the necessarily infrequent trips of the man on foot, small leaks had ample time to waste valuable oil or gas and larger leaks might channel the ground supporting the pipe enough to cause a complete failure. In the case of oil leaks, the escaping oil is often carried off underground, to appear some distance from the pipe-line right-of-way, which might easily be passed unnoticed by the pipe-line walker.

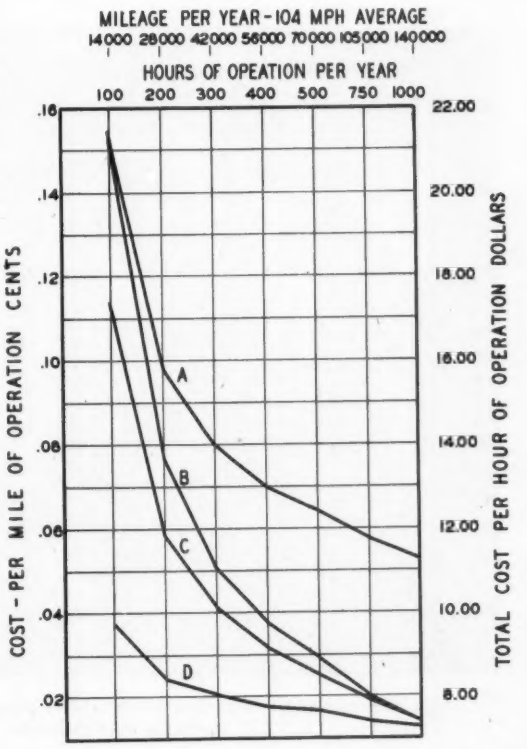
Flying the pipe lines is comparatively new. C. B. McMahan, of Monroe, La., is generally considered to be the dean of such flyers, having inaugurated his first pipe-line patrol by plane in 1931, between Monroe and St. Louis. McMahan gives credit for the idea to Ben C. Comfort, president, Mississippi River Fuel Corp., who suggested the advantages of aerial observation.

At this writing, McMahan has three Stinsons operating from the Gulf Coast to the eastern seaboard, and his lines under contract include the Big and Little Inch gas lines. His three planes flew some 300,000 miles of scheduled patrol last year, and to date his company boasts a record of non-interrupted service on any pipe line under aerial patrol, from causes apparent to the line inspector. McMahan, who is now in his fifties, started flying in 1917. He flies one of his own patrol planes and has logged in excess of 18,000 hours in the air. Due to the rapid discoloration of vegetation, which stands out in contrast when viewed from the air, gas leaks have been detected that when uncovered by repair crews, were so small it was necessary to soap the line before the leak could be discovered, he said.

Pipe-line flyers usually make contact with ground stations along the line by dropping messages in containers. Suspected leaks can be checked in a matter of minutes, by contacting with stations on either side of the possible rupture point, and these stations run pressure tests and send out repair crews at the direction of the pilot. Type of aircraft for this work varies from the small planes to Stinsons and Navions, which carry photographic equipment and radio for emergency reports.

At least one firm, Air Plane Pipe Line Patrol Co., Tulsa, has done considerable research work on the open-lens, continuous-strip type of camera, for photographing pipe-line right-of-ways and then projecting the image on a viewing screen. Principle of the continuous-strip camera is basically the same as those used by the old-time photographers who made large group photos with a spring-driven camera which automatically swung from one side to the other for a panoramic view.

Advantages claimed for this type camera, for pipe-line patrol, is that periodical runs may be made and two films projected simultaneously on two screens, giving a comparison of existing conditions with those, say, of 1 year ago.



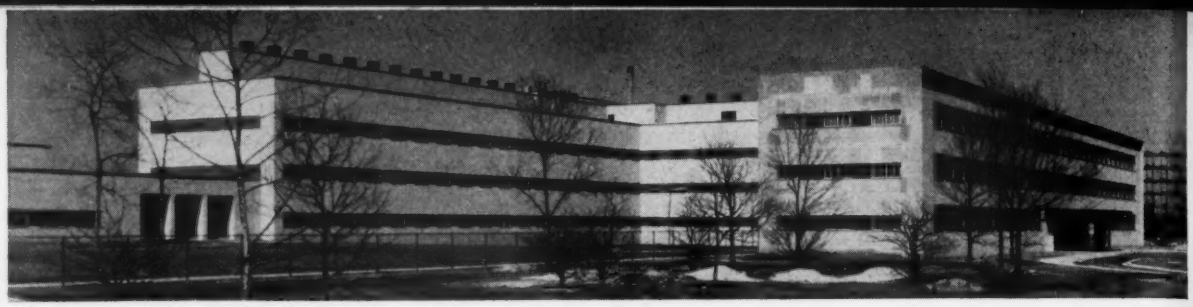
This is graph of fixed-cost figures for one type of useful single-engine plane (see discussion for details)

A. Total cost per plane mile in cents

B. Total operating cost per hour in dollars

C. Fixed cost per mile in cents

D. Total cost per seat mile in cents



Office building and main laboratory of Standard Oil Co. (Indiana) at Whiting. The laboratory building is connected to the office building at all three levels

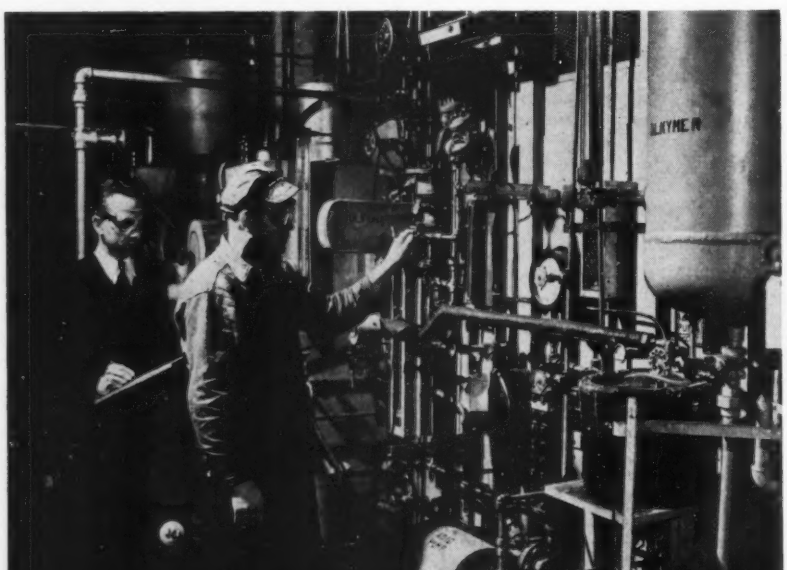
Indiana Standard's New Research Lab Houses Highly Organized Activity

by R. B. Tuttle

THIS month, the Standard Oil Co. (Ind.) research staff moved into new quarters at Whiting, Ind. The buildings which house the staff and laboratory equipment are only a part of a vast project which when later completed will be one of America's largest petroleum research laboratories. The eight new buildings, now incorporated into the Whiting unit, provide nearly 7 acres of floor space for a personnel upwards of 1,200.

Offices of the Whiting research department are housed in a 342 by 40-ft. building. For flexibility in layout all office and corridor partitions are movable. Single office-space units are approximately 10 by 14 ft. and by removing one or more partitions a large office area or even a conference room may be obtained. The removable panel partitions are treated to reduce sound transmission and corridors are acoustically treated. Recessed fluorescent lighting provides 50 to 60 ft.-candles illumination at desk level and each of the small office units is equipped with its own utilities and ventilation. Corridors and offices are air-conditioned and each room has individual thermostatic control.

Now housed in the 68 offices of the building are the research directors and the personnel engaged in administration, process design, exploratory economics, and library reference work. The main library contains more than 5,000 volumes and some 1,000,000 abstract cards. Microfilming of laboratory records is carried out on the third floor of the office building adjacent to the library.



One of the numerous pilot plants. This one is used to obtain data on processes for making chemicals from petroleum

Main Laboratory Building

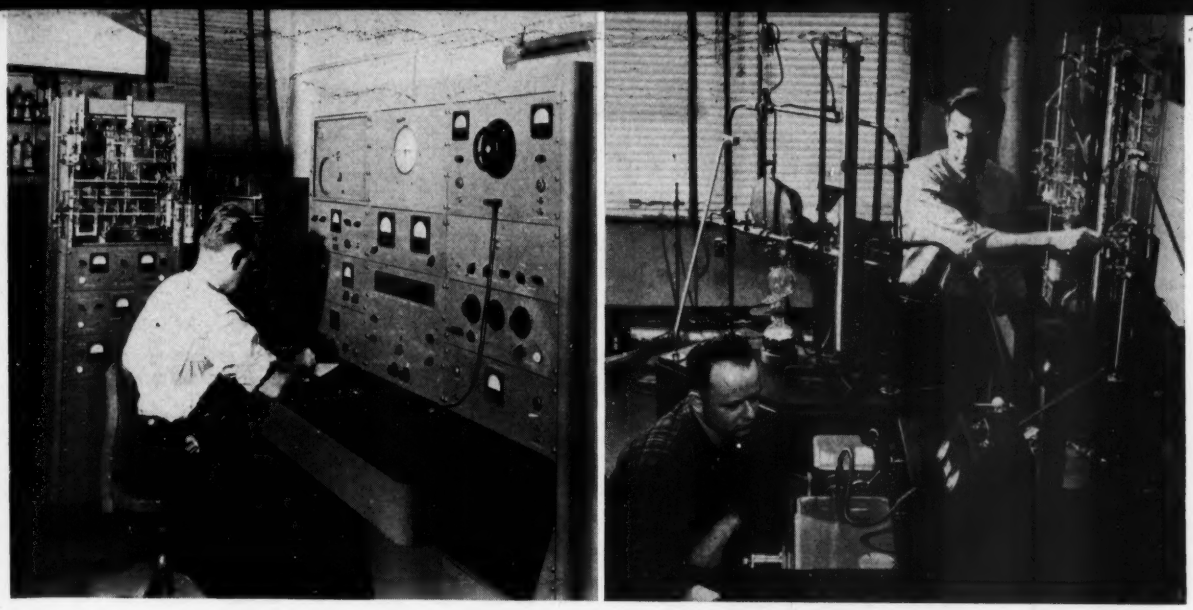
Connected to the office building at all of its three floor levels, the main laboratory building is located a short distance westward. This building provides 126,000 sq. ft. and contains approximately 100 laboratories, a number of offices, and other rooms, all of which are air conditioned. Like the office building the main laboratory is laid out in units with movable partitions; however, corridor partitions are located permanently. Single-space units are either 11 by 16 ft. or 11 by 20 ft. arranged such that the corridors are off center. This scheme provides additional flexibility to that of the movable partitions. Two units constitute working space for two chemists.

The research carried out in the main laboratory is almost entirely basic or exploratory. New separation methods and chemicals from petroleum as well as small scale on hydrocarbon reactions and basic work on hydrocarbon properties plus studies of new analytical methods are some of the subjects included.

Other Buildings

Warehouse facilities for the research laboratories are located in a 272 by 70-ft. building along with automatic telephone switching equipment, locker rooms, and a cafeteria. As in the laboratories this building is air conditioned on a once-through basis. The cafeteria kitchen is furnished in stainless steel throughout and is equipped to serve 1,500 people. Dining-room accommodations are for 240 people without crowding.

Research on grease, insecticides, fungicides, and other specialties is



Left: A mass spectrometer, enabling analysis of hydrocarbon mixtures in hours instead of days. Right: Infrared spectrometer in operation

housed in a one-story building of 32,000-sq. ft. area. Part of the building is provided with an increased ceiling height to accommodate pilot-plant equipment for investigations in grease manufacture.

A wing on the building houses a machine room, a Dowtherm unit, air-conditioning equipment, and various other machinery and equipment. The utilities, gas, steam, process water, and electricity for the research-laboratory project are obtained from Standard's Whiting refinery, located nearby. Distribution panels for electric power and steam regulators are also located in this wing of the building. Other equipment installed in the wing include vacuum pumps, air compressors, drinking and fire-fighting water pumps, and sewage pumps.

Barrel storage is combined with garage facilities in a single 114 by 62-ft. building. The two other laboratory buildings are not connected to the larger buildings nor are these buildings air conditioned. Except for their permanent interior walls, these two laboratory buildings conform to the design of the main laboratory and other structures in the project having movable partition walls.

Catalyst Development Lab

The larger of these two buildings provides 28,000 sq. ft. of floor space and carries the name of chemicals-process laboratory. In this building, pilot-scale experimentation on conversion of petroleum raw materials into chemical products, will be carried out. The main process area, 50 by 120 ft., occupies three floors. Pilot-plant work on such products as synthetic detergents, higher alcohols, new organic acids, and other chemicals that can be made from petroleum, will also be conducted in this building. Storage and locker facilities, four offices, three laboratories and a cold room will be housed in the two-story section of this structure.

New catalysts and the equipment for pilot-plant operations on the catalysts in the synthesis of hydrocarbons will be studied in the catalyst-development laboratory, a 122 by 72-ft. building. Work on catalyst development will be conducted on two floors of the building in an area of some 3,000 sq. ft. per floor. Hydrocarbon-synthesis work will be carried out in a section of the laboratory which provides an area 40 by 45 ft. and extends 30 ft. above ground-floor level. This area is separate from the catalyst area and will contain a pilot plant and related equipment. Storage space, a cold room, locker facilities, two offices, and two laboratories are housed in the catalyst-development laboratory.

A general-process laboratory is located in another building having some 5,000 sq. ft. of floor space. Distillation and other general process work will be carried out in this laboratory. Approximately one-half of the floor space in the building is occupied by the process area. More than 40 ft. headroom in this area will permit housing of large distillation columns. Facilities for oil blending are incorporated into the general process-laboratory layout. An office and a laboratory plus hot and cold rooms are also contained in this building.

Subsequent additions to Indiana's present Whiting research laboratory setup include other pilot-plant buildings, an engine laboratory, a garage, craft shops, and auxiliary structures. At Whiting refinery work is now under way on a new engineering and administration building and an engineering-research laboratory.

Over-All Program

The research program of Standard of Indiana is a large-scale, highly organized activity. The annual research expenditure of the parent company is in excess of $6,000,000. This represents only part of the total program. In addition, extensive research laboratories of Stanolind Oil & Gas Co. at Tulsa deal with problems related to the discovery and production of crude oil and the development and exploitation of gas reserves. The Pan American Refining Co. operates large laboratories at its Texas City refinery. Smaller technical staffs are maintained by the Utah Oil Refining Co. at its research laboratory in Salt Lake City; by the Pan American Petroleum Corp. and the Root Petroleum Co.; and by the parent company at its refineries at Wood River, Ill.; Sugar Creek, Mo.; Casper, Wyo.; and Neodesha, Kans.

The three big research centers, however, particularly as regards development of new products and processes, are Whiting, Tulsa, and Texas City. At Whiting are handled general research and development problems, as well as process design work for all the Indiana refineries and for the refineries of the smaller subsidiaries.

The research and development work at Tulsa covers three major fields: (1) basic research on exploration, and the development of new geophysical techniques and instruments, such as the seismograph and the gravity meter, which are also being further improved for use in coastal waters; (2) studies of new and improved methods of drilling for and producing oil from the underground reservoirs; and (3) methods of converting natural gas into more valuable products, particularly synthetic gasoline and oxygenated chemicals.

The Pan American laboratory at Texas City is to a considerable extent engaged in rendering technical service to the large manufacturing operation there. However, it is also interested in the utilization of petroleum fractions in the production of chemicals, and is engaged in research on such products as plasticizers, synthetic resins, drying oils, and solvents.

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Western N. Y. and Pa.	43	41	— 2	— 4.9
West Virginia	399	450	+ 51	+12.9
Ohio	25	20	— 5	—20.5
Illinois	455	392	— 63	—13.9
Kentucky	149	192	+ 43	+29.1
Michigan	12	7	— 5	—43.4
Kansas	310	317	+ 7	+ 2.3
Oklahoma	1,209	1,257	+ 48	+ 3.9
Texas	6,853	7,790	+ 937	+13.7
Gulf	1,713	2,132	+ 419	+24.4
East Texas	927	912	— 15	— 1.6
Panhandle	1,730	1,942	+ 212	+12.3
Other	2,483	2,804	+ 321	+12.9
Arkansas	274	274	....	....
Louisiana	1,608	1,768	+ 160	+ 9.9
Gulf	919	946	+ 27	+ 2.9
Inland	689	822	+ 133	+19.3
Mississippi	(*)	124	+ 124	(*)
New Mexico	272	287	+ 15	+ 5.4
Colo., Utah, Wyoming	144	202	+ 58	+40.9
Montana	13	26	+ 13	+98.0
California	2,781	3,192	+ 411	+14.8
Total United States	14,547	16,339	+1,792	+12.3

*No plant production in early 1949.

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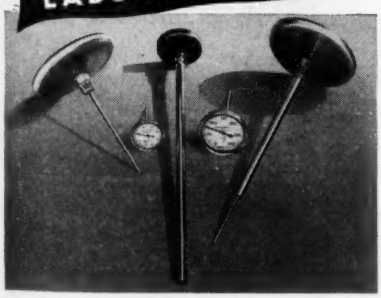

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Expansion in Production

(Continued from page 158)

For the oil operators and petroleum engineers viewing the latest designs and newest innovations in oil-producing equipment at the 1948 International Petroleum Exposition, it was "their show" in a very big way. Thousands of pieces of oil-field-equipment products had been brought from the factories and manufacturing plants for them to see.

Both full-scale products and miniature working models were set up on display—and the prospective purchasers were looking them over inside and out, asking questions, inquiring the prices, finding out about delivery dates.

These operators and engineers that were giving a careful look at the oil-show exhibits comprised the actual purchasers and users of the huge volume of products that pour from one of the country's great industrial pursuits—the manufacturing and distributing of oil-field equipment and supplies. The close scrutiny the exhibits were getting stemmed from the fact that everyone attending the exposition knew that the oil-and-gas-producing business was at the highest level in its history. New highs in production had been made repeatedly so far in 1948 (see graph).

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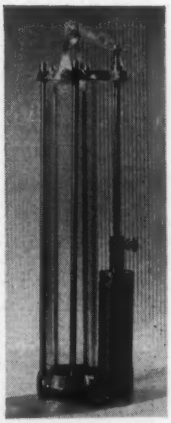

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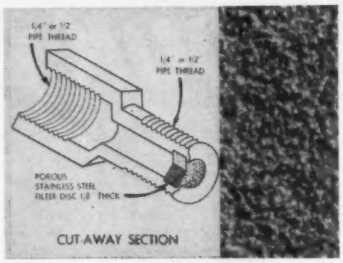

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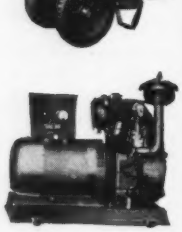

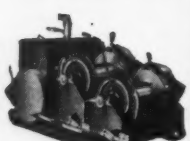

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Exploration, Drilling Exceeding Schedules

(Continued from page 155)

a problem. So he turned to radio surveying, conventional radar, shoran radar, and now proposes to use lorac, a still newer development.

Among the major contributing factors to the record-breaking drilling campaign is increased efficiency in actual drilling and completion operations. To the drilling contractor and company drilling department, this sums up to the never-ending battle against time. Bit-on-bottom time versus total time elapsed from starting to rig up for one well to starting to rig up for the next one, is the index that measures efficiency.

At the present time this problem divides itself fairly cleanly into two separate phases. For the practically 80 per cent of the wells drilled to 5,000 ft. or less, the gains to be made by shortening the bit-on-bottom time are getting less important. The biggest opportunity for increased efficiency lies in shortening up the other segment of time, the portion when the bit is not making hole. Rigging up, tearing down, moving from one location to another, running pipe, waiting on cement, company time for logging, testing, and completing sometimes take up twice as much time as actual drilling.

Of these problems, rigging up, tearing down, and moving are the only ones over which the contractor has much control. This accounts for the strong trend toward portability, packaging units for quick assembling and disassembling, special equipment for quick moving, etc. Assuming that he gets his share of the available contracts by bidding with an eye to the length of moves for his rigs, profits depend on cutting down the time the bit is not making hole.

The heavy-rig, deep-hole contractor is also interested in these things, even though the time percentage involved is not so large for him. The percentage of time may be smaller, but the number of days involved is much larger. Large, heavy rigs take longer to set up and tear down than smaller ones, even if the handling efficiency is the same pound for pound. With a much larger investment, idle time costs much more per day. Hence the steady progress, and great interest in package units, special moving devices, and general ease in tearing down and reerecting the heavy rigs.

But percentagewise the heavy-rig contractor has plenty to gain from lengthening the bit-on-bottom time during actual drilling operations. Therefore he studies more closely items devised to eliminate round trips, or to shorten the time required. The deeper the well, the more important these become. Improved drill pipe and bits, inspection devices that will detect weaknesses before failures develop, improved mud control, greater pump efficiency, faster hoisting and speedier running in, powered tools replacing hand tools, and automatic controls are more important on the deep holes than on the shallow.

Constant improvements are the order of the day, and deep holes are being completed in faster time each year, but the contractor will never be completely satisfied. This attitude on the part of both shallow and deep-well contractors is playing no small part in piling up the record-breaking number of completions.

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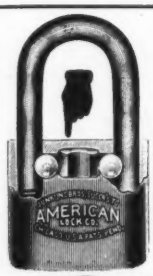

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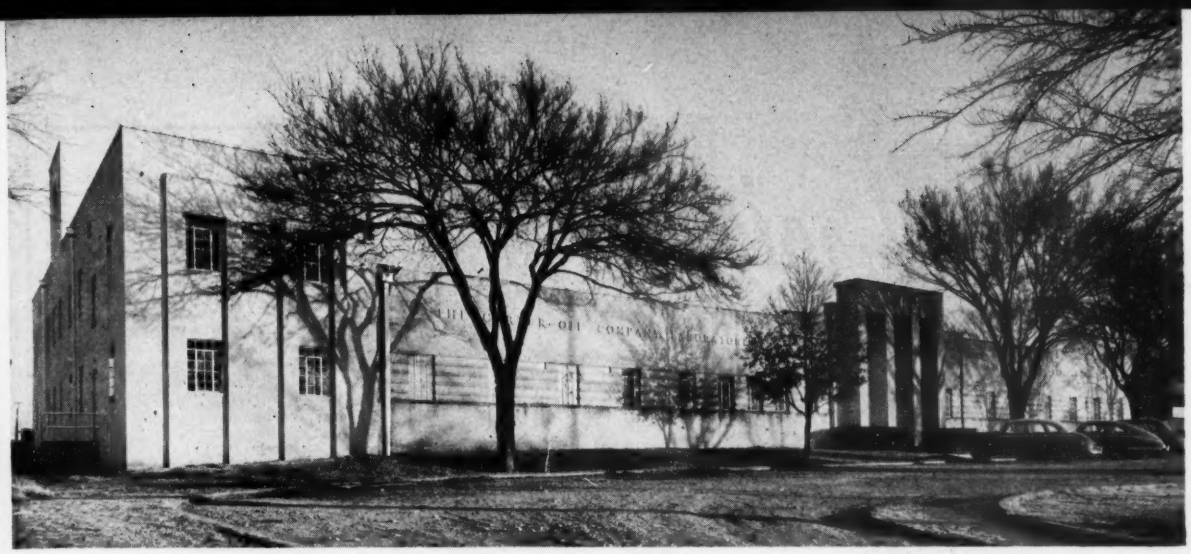

Carter Oil Co.'s Tulsa laboratories—recently twice expanded—are devoted to research in exploration, drilling and production problems

Why Is Oil Where It Is
What Are Best Methods of Finding Oil
How to Get More Oil Out of the Reservoir
How to Improve Exploration and Production Equipment

?

Carter's Research Program Geared to Seeking Answers to These $64 Questions

by Leigh S. McCaslin, Jr.

COMPLETION of a new two-story wing costing approximately $170,000 and announcement that construction will start soon on a similar wing, has focused attention on Carter Oil Co.'s research laboratory in Tulsa. When totally completed the laboratory, including a machine shop, will provide about 50,000 sq. ft. of space and will represent a total investment in building and equipment of approximately $700,000.

A staff of 100 engineers, scientists, and technicians under the direction of Dr. P. S. Williams, chief of research, and Dr. R. N. Meinert, assistant chief of research, is constantly striving to answer such questions as: (1) Why is oil where it is? (2) What is the best method of finding oil? (3) How can we get the most oil out of the reservoir? (4) How can production and exploration equipment be improved? To develop answers to these questions, the laboratory staff is divided into four sections each under a section head as follows:

Geological research section, Dr. P. A. Dickey.

Geophysical research section, Dr. E. M. McNatt.

Exploitation research section, Dr. W. A. Bruce.

Development engineering section, F. G. Boucher.

1. Why is oil where it is?—The approach being used by Dr. Dickey and associates in attempting to answer this question is based on a detailed and comprehensive study of the reservoir rocks in which oil is found, and the possible source rocks from which it may have migrated. The organic matter in the shales and the hydrocarbons in the oil are being examined chemically so that their relationship can be determined. It is hoped that these studies will provide some of the facts on which to base hypotheses explaining the origin and accumulation of oil. If a sound theory could be developed, it would enable geologists to search for oil more intelligently and predict more accurately the most likely places for drilling.

Contrary to popular belief, anticlines (structural "highs") are not necessarily the most favorable places to look for oil. A goodly proportion of the earth's oil reserves is known, by geologists, to be contained in stratigraphic traps. Anticlines have been the object of most searches for oil in the past, primarily because they are easier to find with present exploration methods. A better understanding of sedimentary rocks might provide usable methods of locating stratigraphic accumulations.

Reservoir rocks, such as sandstones, are being studied by grain-size analysis and examination of thin sections. Grain-size analysis has been widely used in the study of sands in the past. Thin sections have been used for many years in the study of igneous rocks, but their uses in the study of sediments have not yet been fully developed.

In the study of both source and reservoir rocks clay minerals are extremely important. Quite probably the oil was generated in fine-grained

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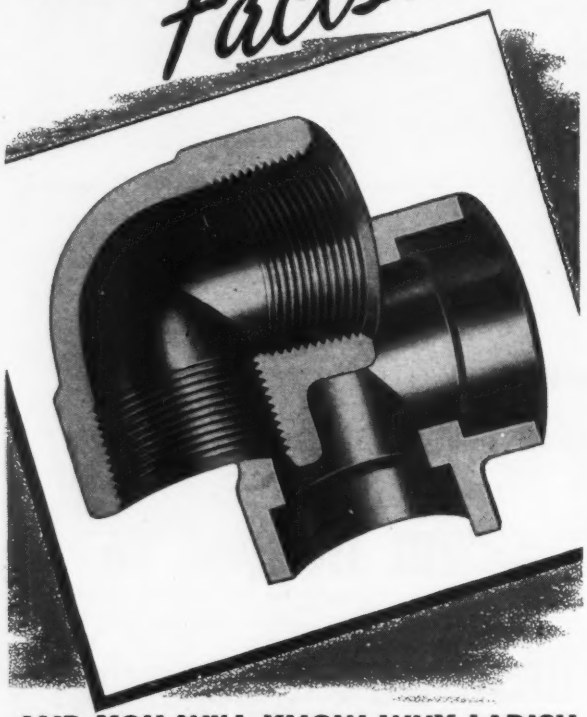

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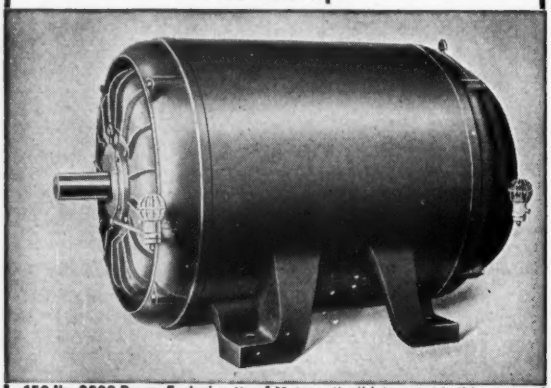

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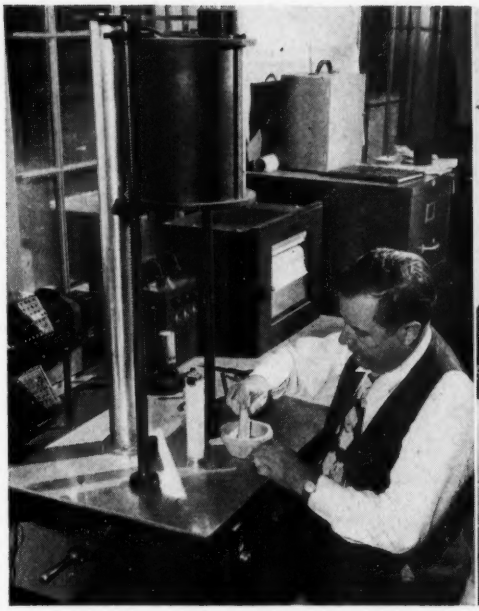


Extreme right: Carbonaceous materials in formations are determined by the infrared spectrophotometer shown in front of Dr. J. M. Hunt

shales, composed largely of clay minerals, rather than the sands in which it is now found. These substances are very complex in composition and physical properties and are not well understood. The particles as a rule are too fine to be identified with the microscope, but recently other methods have been devised for their study. Among these are X-ray diffraction, chemical methods, and the differential thermal analyzer, which can be seen in the accompanying picture.

The analyzer records the magnitude of the endothermic and exothermic reactions which take place as clays are gradually heated. These reactions occur as the water of crystallization is driven off, the crystal lattice broken or changed, and recombination of the elements occurs.

For the test, an inert material (aluminum oxide) is placed in one of the four small holes in the block, which can be seen directly to the left of the hand of the operator, Dr. W. S. Hoffmeister, research geologist. The clay samples are carefully pulverized and placed in the remaining three holes. A thermocouple contained in the bottom of the holes registers the difference in temperature between the clay and the inert material, and this temperature difference is recorded on the potentiometer to the right as the furnace temperature is increased. The characteristic curves obtained can be used in the identification of clay minerals.

A relatively new and useful device in the study of hydrocarbons is the infrared spectrophotometer, illustrated in an accompanying picture. It is being used by Dr. J. M. Hunt in the study of oils, asphalts, and waxes, and the carbonaceous material in the accompanying shales from which these hydrocarbons may have been derived. In its operation, infrared radiation of continuously varying wave length is passed through the sample. The amount of energy absorbed by the substance at each wave length is measured and automatically plotted as per cent absorption versus wave length. Different hydrocarbons have characteristic absorption bands which show up as valleys on the curves. It is hoped that with this instrument the relationships between the hydrocarbons in the oil pools and the carbonaceous matter still in the sediments may be worked out.

Exploration Studies

2. What is the best method of finding oil?—This and many other related questions are still unanswered, from a detailed scientific standpoint, in the field of seismic prospecting. Dr. McNatt and the geophysical research section are interested in finding the answers to these questions as a part of their work. Although seismic prospecting problems occupy a large portion of their time, they are also interested in electrical, magnetic, and gravity-meter prospecting methods.

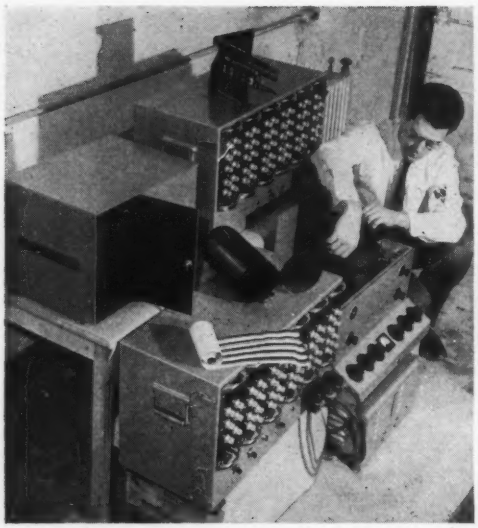
One problem in the field of gravity-meter work is connected with the errors involved in this method of exploration. In other words, how accurate is the picture that is received? With regard to electrical prospecting methods, one of the principal interests is in determining where, when, and how electrical methods can best be used.

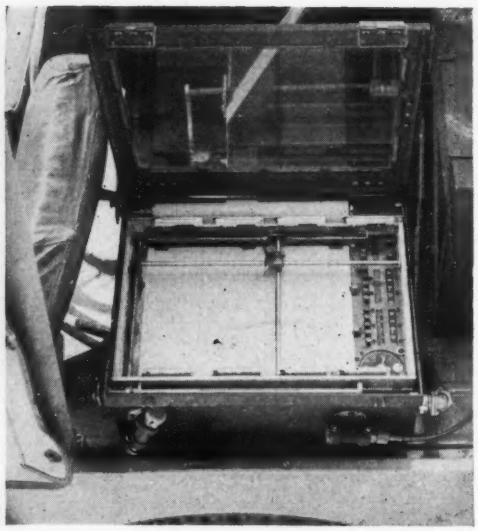
To further seismograph studies, Carter keeps an experimental seismograph crew of 10 men in the field continuously at a cost of approximately $9,000 per month. The work of this crew and the work of the men in the laboratory is directed toward finding more of the basic facts about the seismic process, developing new methods, improving equipment, and techniques. Despite the fact that this type of prospecting is widely used, many of the operations involved are, from the standpoint of pure science, pretty much of a rule-of-thumb proposition. For example, some of the questions which need to be answered are: What are the transmission characteristics of the earth? What does the seismic pulse look like? In placing a shot, how much dynamite should be used and in what kind of rock should it be put?

A high-speed camera—designed to record a seismograph pulse at 10 times normal speed of present field units—is now being built at the laboratory. This camera will make possible more detailed studies of the seismic pulse. Timing lines are 0.0005 second apart instead of 0.01 as is conventional. The drum of the camera contains 50 in. of recording paper with 0.1 in. on the paper equalling 0.0005 second.

In seismic research work, as distinguished from seismic prospecting, it is desirable to repeat the same shot several times under the same conditions. However, it is almost impossible to get two shots in the field to give exactly the same results. Hence, Carter assembled equipment known as a "recorder-reproducer" to "bring the shot point into the lab."

This equipment (James J. Roark is changing a chart in an accompanying photograph) is designed to pick up ground pulsations from the shot as they reach the geophone, record them, and then play them back in the lab to enable further studies. The pulses, as recorded, are exactly as received at the geophone rather than filtered as when recorded with standard seismograph equipment. In other words, the record is as near distor-





EXPLORATION

Extreme left: The "Recorder Reproducer" is a Carter-constructed electronic assemblage which "brings seismic shot points into the lab for study." James J. Roark is shown changing a record chart

Left: Odograph, mounted in automotive equipment automatically maps the travel path of survey parties engaged in exploration work

tionless as is possible which is very important for testing and research. The recorder portion of the equipment picks up reflections and can record them on film using the movie soundtrack principle, or on standard seismograph paper. Special geophones, amplifiers, and gain-control apparatus are used for recording and reproducing.

This technique is extremely useful in seismic research for three primary reasons: (1) It is almost impossible to get two shots in the field to give exactly the same results. (2) The method is cheaper than repeated field shooting. (3) It gives reproducible shot records from which controlled tests can be made on any type of seismic equipment. There are several specific possible uses for the equipment. By use in conjunction with a "shaking table," it can simulate the vibrations of the earth's surface following a seismic shot, thus bringing the shot point into the lab. Another possible use is to determine the difficulty in areas where poor seismic records are being obtained by field crews. The device can be sent into the field and sample records made to be brought into the lab for study. It might be determined from this lab study, for instance, that a different filter combination is needed for the field seismograph.

A study of surveying methods is included in the work of the geophysical section because of the fact that location and elevation must be accurately known in all exploration methods. Any development leading to faster and cheaper surveying would be of considerable importance. One such development now under test at the laboratory is the well-known odograph which was used by the Army during the war and which automatically maps the path of a car as it travels along. (See accompanying picture.) The mapping portion of the odograph is a resolving and integrating mechansim which is tied into a magnetic compass and an odometer. The unit obtains direction information from the compass, distance information from the odometer, resolves this information into east-west and north-south components, and then integrates it. Thus the machine produces an actual map of the path of the car, less elevations.

Research on Production Problems

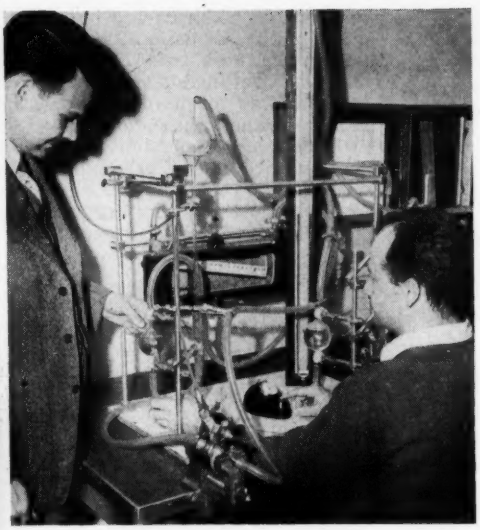
3. How can we get the most oil out of the reservoir?—This question summarizes briefly one of the objectives of the exploitation research section under Dr. Bruce which has three major phases of activity as follows: (1) Reservoir behavior including laboratory study on the behavior of fluids in porous media. (2) Secondary-recovery problems. (3) Cost reduction. A number of research projects falling under these headings are under way at present or have been recently completed.

Study of the behavior of fluids in porous media has been broken down into two subdivisions—behavior under static equilibrium, and behavior with dynamic flow. Of particular interest in Carter's work along this line is the development of the restored-state technique of studying cores. Equipment for this procedure is shown in an accompanying picture in which R. C. West, research engineer, and Miss Jessie Hume are preparing for an experiment.

Briefly, the procedure is as follows: Core samples are shaped, cleaned, then saturated with a reservoir or synthetic brine. Porosity is determined by a weight process. The saturated core is then set up in an apparatus, as shown in the figure, in such a way that continuity is established between a water phase below a porous disk, on which the core rests, and a water phase inside the core. This continuity is maintained with the aid of soft paper which is placed between the core and the disk. Crude oil from the field being studied is poured around the core and a difference in pressure is established between the oil phase and the water phase. The pressure used is sufficient to cause the oil to enter the pores of the rock specimen, but not those of the disk. As this difference in

PRODUCTION

Connate-water determination of core samples are made by Carter via the "restored state" method (see The Oil and Gas Journal, July 26, 1947, p. 223). Operators shown are Miss Jessie Hunt and R. C. West



PRODUCTION

W. J. Leas and Loren Jenks start up a run on Carter's relative permeability apparatus

pressure is increased, water is forced out of the core. When the displacement of water is at an end, the core has been restored to its original state in the reservoir, before it was penetrated by the drill, and hence the term "restored state." The core is removed from the apparatus and the residual water measured precisely by distillation with toluene. By means of the restored-state technique, further experiments such as relative permeability and water and gas-drive studies can be carried on. The technique has been licensed to a number of oil and service companies.

Considerable other apparatus of interest is used by the exploitation section in the study of behavior of fluids in porous media. W. J. Leas, and Loren Jenks are conducting a relative permeability experiment in one of the accompanying pictures.

Relative permeability is, of course, related to dynamic flow in the study of fluid behavior and of great importance in reservoir work. In another picture, Dr. Bernard Sakmann and A. M. Wilkins are using apparatus to test rocks under pressure. Object is to simulate the pressures sustained by reservoir rocks as a result of the thousands of feet of earth above the reservoir.

Intensive work is under way on a study of oil-well-cementing operations with the ultimate aim of better completion practices and reduced costs. A study is being made of the various factors—mud weight, mud velocity, position of the casing with respect to hole, etc.—which may influence cementing. The problem is being attacked with an engineering approach and considerable use has been made of models. For these model studies, cardboard tubing has been used to represent the casing and the wall of the hole. After the cement has hardened, the tubes are cut up into 4-in. lengths to facilitate detailed study. Research engineers W. A. Freeman, Jr., and A. W. Hunt are studying these cross-sections in one of the illustrations.

Corrosion Work Pays Dividends

External casing corrosion has been a considerable problem in Loudon pool of Illinois. It is generally recognized that corrosion of this type is due to electric currents generated by "battery action" set up in the casing and the soil surrounding it. Hence, it is important in the study of this corrosion to measure the magnitude of this galvanic action. Carter researchers developed a special electrical probe to measure voltage drops and current inside the casing of the wells. As a result of this work, plastic flow-line nipples were installed to insulate the flow lines from the casings. However, since some corrosion continued to occur, and it was shown that there are galvanic currents flowing in the casing even with the well insulated, a research program is in progress to see if it is economically desirable to apply cathodic protection. If this is done, a protective current of low amperage would be supplied to the system by a rectifier or by a magnesium anode. As can be seen in the pictures, (the young lady is Miss Julia Davis) work is carried on both in the field and in the laboratory to lick the corrosion problem.

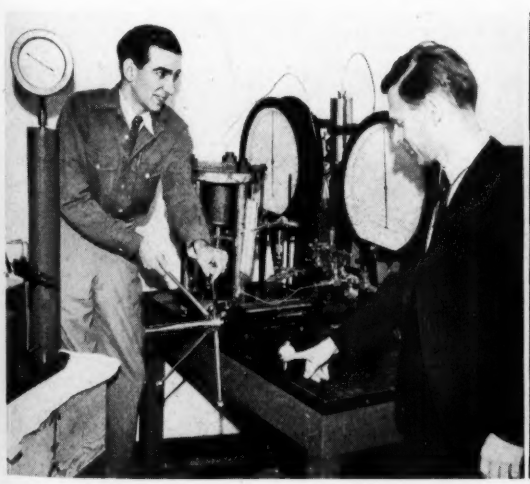
A discussion of the exploitation

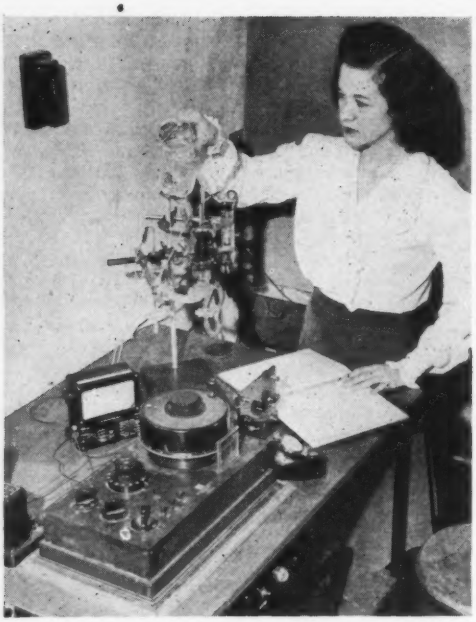
PRODUCTION

Physicist checking possible source of corrosion. The electrical potential developed between the casing of a well and the earth surrounding it is being determined

PRODUCTION **WELL COMPLETION**

Left: Dr. Bernard Sakmann and A. M. Wilkins using apparatus to test compression and expansion of oil reservoir core samples. Right: Well cementing test specimens between two strings of miniature casing are studied by W. A. Freeman, Jr., and A. W. Hunt





PRODUCTION

Laboratory apparatus used on corrosion research, studying stray galvanic currents and application of cathodic protection. Operator is Miss Julia Davis

section would not be complete without mention of the electrical oil-pool analyzer which is possibly its most-publicized research project to date. In effect, the machine takes the known reservoir and producing information about an oil pool and projects the most desirable producing operating procedure for the wells far into the future. These intricate problems can be solved mathematically, but with these two major disadvantages: (1) They require a large amount of highly skilled mathematical work, and (2) problems are continually arising which have such complex boundary conditions that no mathematical method now developed can be used except for an approximate solution.

The analyzer can determine what pressure behavior will result from any assumed production condition; it can compute the rate of withdrawal from a pool to insure the best utilization of the natural-water-drive energy; and it can tell how much water or gas should be put back into the reservoir to maintain a given pressure production behavior. Basic operating principle of the analyzer is simple and rests upon first, the analogy between the conductivity of an electrical conductor and the conductivity of a porous medium; and second, the analogy between the ability of a porous medium to produce stored fluid by virtue of the compressibility of the fluid and the ability of a condenser to release stored electrical charge. The analyzer has been offered to the oil industry royalty free and to date nine of the instruments have been or are being manufactured.

Improvements in Equipment

4. How can production and exploration equipment be improved?—The answer to this question is the job of F. G. Boucher and his staff in the development engineering section.

The wide scope of activities of this section includes: engineering the equipment required by the other sections of the laboratory, testing and maintaining equipment of the Carter field geophysical prospecting crews, and making adaptations and improvements on field equipment of all types.

A research project currently under way in the section is concerned with new drilling methods and new methods of testing formations. Work is also under way on new well-logging methods. Continual development work is under way to improve seismic and gravity-meter equipment. A slightly different phase of activity is the continual training of personnel in the operation and maintenance of gravity meters. Most of the trainees are scheduled for foreign service.

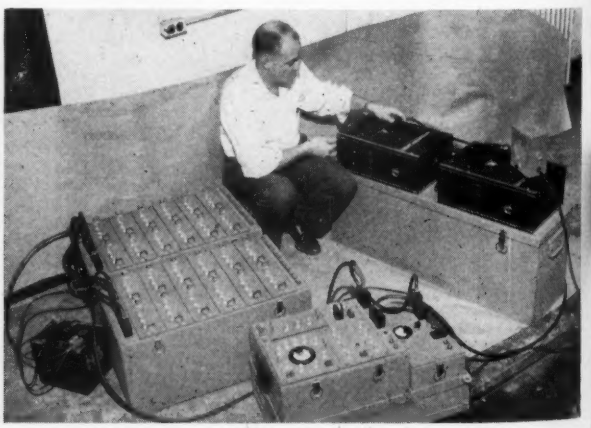
In order to maintain the equipment of field seismograph crews, the section has developed a maintenance truck which performs service work in the United States. The two-man crew spends ½ to 2 weeks with each field group on its periodic checks. Primarily, its job consists of aligning and adjusting amplifiers, adjusting oscillographs, and changing filtering of amplifiers to suit the particular area where the seismic equipment is located. The maintenance truck is a standard, panel-type truck equipped with all necessary tools for working on amplifiers, radios, geophones, and associated equipment. It is also provided with laboratory-type test equipment such as vacuum-tube voltmeter, cathode-ray oscilloscope, and impedance bridge. A 110-volt a.c. generator is mounted in the truck so that standard laboratory equipment may be used. The seismograph maintenance men make trips without the truck to service equipment in Colombia, Egypt, and Venezuela.

Tropical terrain, with its jungles and swamps, sometimes precludes truck transport, thus posing a problem for seismograph crews operating in the tropics. To solve this problem, the section engineers complete seismograph-equipment setups which are broken down into two-man packs for portability. (See accompanying picture with Harold Friend.) Amplifiers are in two boxes with 12 amplifiers in each waterproof box. The oscillo-

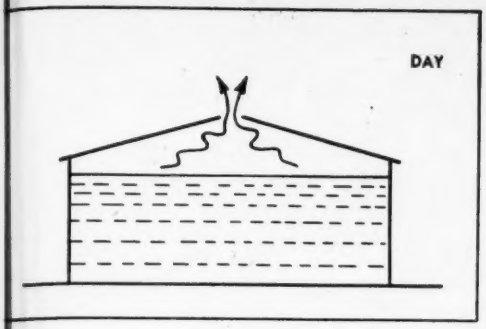
(Continued on page 235)

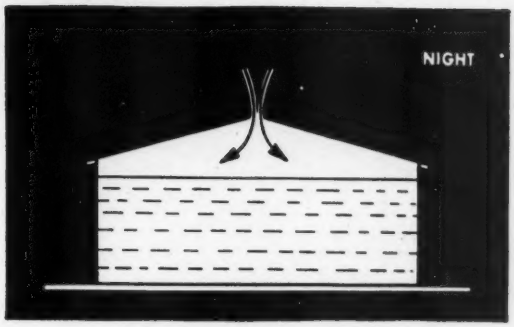
IMPROVED EQUIPMENT

Left: Carter's specially designed maintenance truck for field seismograph work. Equipment is used to align amplifiers, adjust oscillographs, change filtering conditions, etc., to fit the field exploration equipment to best suit the particular area being explored. Right: Portable seismograph equipment built by Carter for use by Jersey Standard affiliates in foreign service, where ease of transportation through tropical terrain, jungles, and swamps is a "must." Harold Friend is shown making a final check-up of electrical circuits



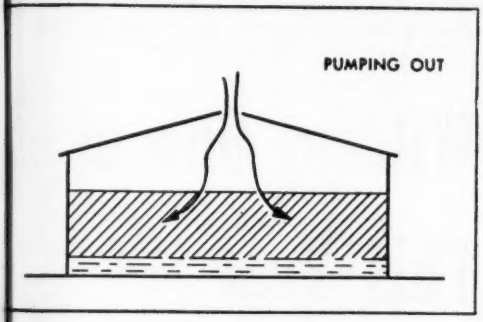
STANDING LOSSES

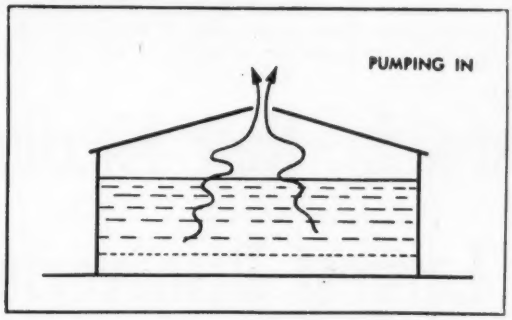




Standing losses vary from 2 to 4 percent of the tank volume per year, depending on the tank size. In addition, the value of the gasoline is reduced through vapor venting.

PUMPING LOSSES





Pumping losses may be conservatively estimated at 0.16 percent of the liquid volume pumped.

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WIGGINS DRY SEAL GAS HOLDER

Folks in New Mexico and West Texas were pretty sure they had a new big oil strike at Crossroads even before the production tests were started on the 1 U. D. Sawyer well. A big barbecue with 1,500 lb. of beef and more than 700 guests was staged by the Sawyers at a picnic site on their ranch right alongside the rig. Numerous state officials and oil company representatives attended (Photo by James Rawls, Hobbs, New Mexico News-Sun). At the initial production tests of the well, H. N. Sweeney, engineer at Hobbs for the State Oil Conservation Committee, said, "Even at this stage of development the well represents the most important oil discovery in New Mexico in years. It sets up an area of millions of acres for oil exploration which heretofore were undeveloped"

Crossroads, New Mexico, Wildcat One of Largest Discoveries This Year

12,000-Ft. Test Flows 3,775 Bbl. Per Day

by Kenneth B. Barnes

SIX miles east of the little settlement of Crossroads, (pop. 165) Lea County, New Mexico, with pay at 12,115 to 12,215 ft. appears to be what so far possibly is this year's largest wildcat well—Mid-Continent Petroleum Corp. 1 Sawyer, located in SW SE 27-9s-36e. On production tests, the well has flowed through ¾-in. tubing choke at the rate of 3,775 bbl. per day of 42.6°-gravity crude oil. Hourly initial production figures were 137, 168, 198, 102, 160, 170, and 60 bbl. the last 20 minutes—or totaling 995 bbl. for the 6-hour-and-20-minute interval.

The significant strike of 1948 may turn out to be this Mid-Continent Petroleum Corp. discovery well in the northwestern reaches of the Permian basin. Thus again the importance of the West Texas-New Mexico area as one of the major hunting grounds for deep oil reserves is emphasized.

For a considerable period there has been a steady and continuous run of "development drilling" to the deeper Devonian, Silurian, and Ellenburger formations in proven and semiproven areas in this territory. Today it takes a rank wildcat oil completion, and a big one, or one in strictly outpost territory to make big or unusual oil news. This new discovery qualifies on both counts.

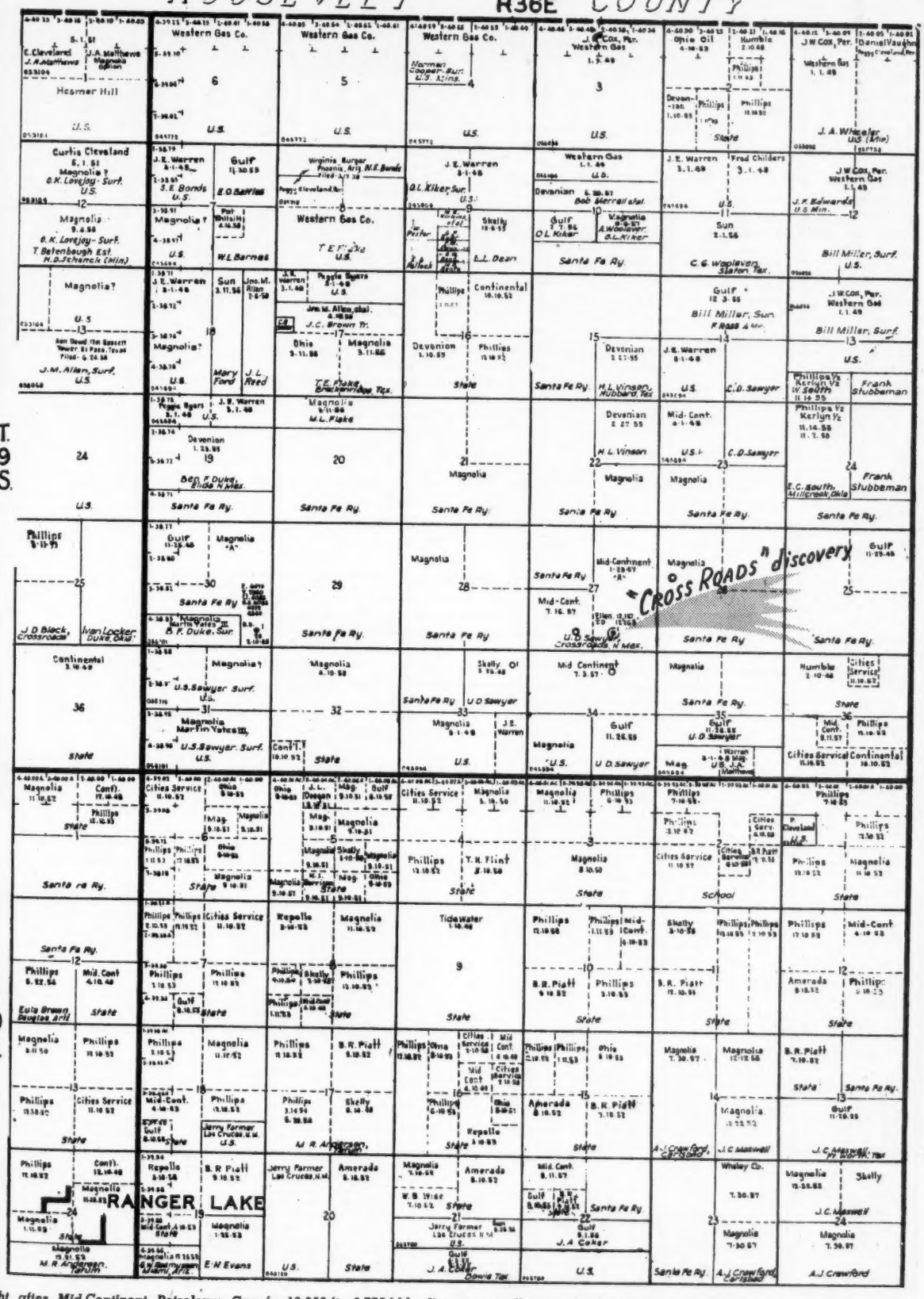
GEOLOGICAL TOPS — MID-CONTINENT PETROLEUM CORP. 1 SAWYER

	Feet
Rotary table elevation	4,034.5
San Andres	4,110
Glorietta	5,455
Clear Fork	6,200
Wichita sale	7,690
Abo shale (Upper Wolf Creek)	7,710
Wolf Camp	8,960
Pennsylvanian	9,510
Strawn	10,570
Coral Zone	10,680
Bend	10,810
Devonian (or possibly Ellenburger)	12,110
Perforated section	12,115-12,215
Total depth	12,258
Initial ("F" 995/6.33 hr. through ¾-in. choke)	3,775/24

Permian Basin Area

Such spectacular new discoveries have been coming fast in the Texas-New Mexico basin. It was only 6 months ago, or last December, that one of 1947's candidates for the "well of the year" was brought in in another part of this large territory. That well was the 1 Alford of Benedum pool, near Big Lake in Upton County, Texas *(The Oil and Gas Journal, February 5, 1948, page 60)*.

"Crossroads" (as the New Mexico discovery will be called) and Benedum have several points of comparison. Mid-Continent's discovery is up beyond the former northwestern oil-productive boundaries of the basin. The other is located down near the



Right after Mid-Continent Petroleum Corp.'s 12,258-ft. 3,775-bbl. discovery well was completed, four new locations were staked around it. The Santa Fe railroad owns some 15 sections of land in the area. This ownership map (courtesy Southwest Mapping Co., Fort Worth) shows the numerous companies represented in the vicinity. A regional map of southeastern New Mexico and West Texas published in last week's issue of the Journal (page 197) shows position of the Crossroads discovery in the vast Permian basin country

known southeastern edge. The two wells are about 150 airline miles apart.

The Benedum well started a big leasing and exploration play in the southern end of the Permian basin. At the other end, the Crossroads wildcat this month has done the same thing.

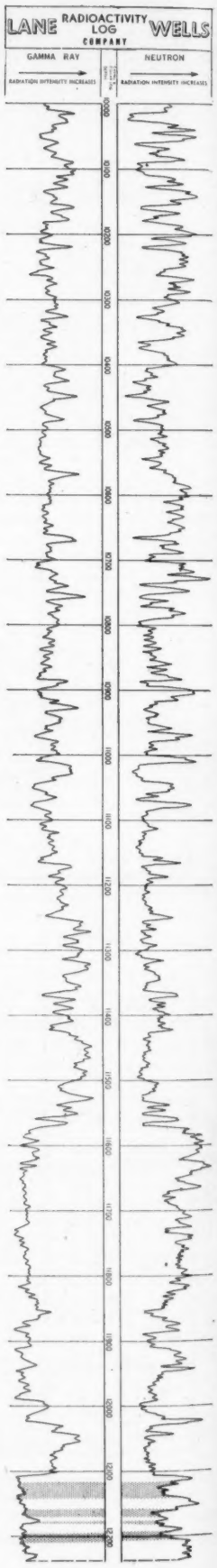
Both wells found their production almost exactly at the 12,000-ft. mark. The Benedum well is an Ellenburger completion. The pay zone for 1 Sawyer is either Silurian-Devonian or Ellenburger.

Significance of the Crossroads discovery well—besides the potential reserve indicated in its own right—is that its structural location is on the long Rhodes, Langlie-Mattix, Skelly-Penrose, Eunice, Monument, and Hobbs trend of pools northward in New Mexico from Texas. The trend possibly may extend on farther north. Likewise, the new pool will cause a search for other structural features to the south and southeast to connect with the above pools. Thus, like Texas' Benedum well down on the south edge of the basin area, the New Mexico discovery creates a large new spread to "fan out from." This is to say nothing of the huge exploration and development area in between which already is dotted here and there with medium to prolific Devonian, Silurian, and Ellenburger production.

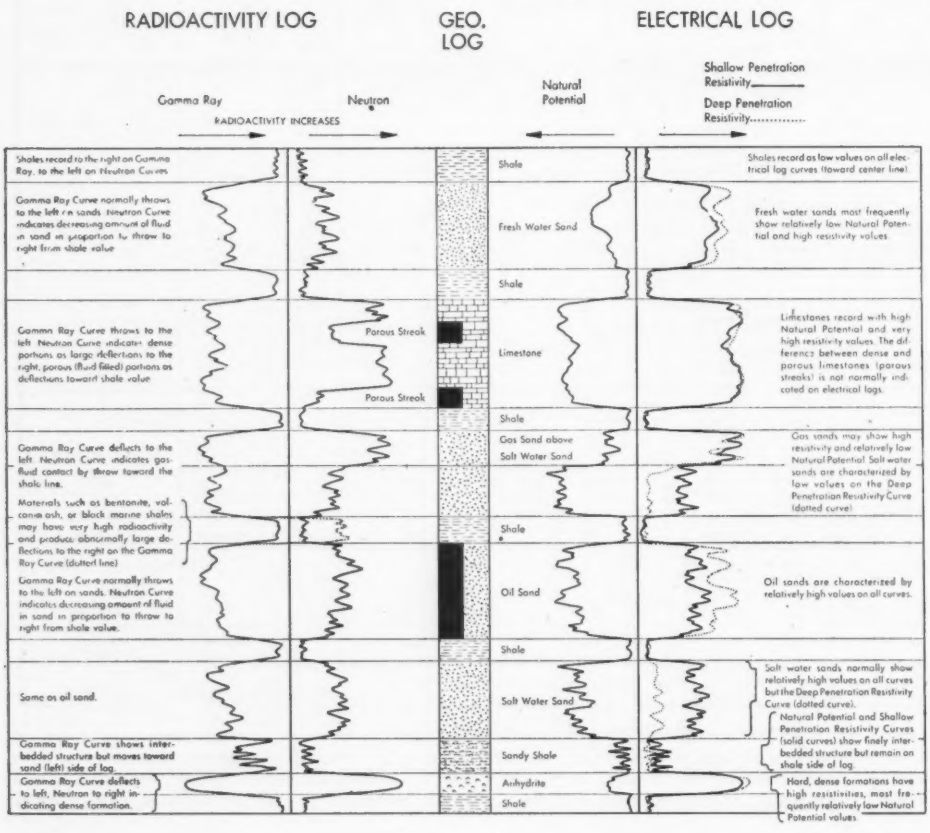
The Crossroads well originally was drilled as a "tight hole," but as soon as the 12,255-ft. 5½-in. casing string was run and cemented with 700 sacks, a radioactivity log run, and the zone 12,115 to 12,215 ft. gun perforated with 600 shots a production test was made and the operator released completion data.

A party of Mid-Continent Petroleum Corp. officials from Tulsa, including executive vice president Robert W. McDowell and Albert E. Pierce, vice president in charge of production, flew to New Mexico to check the initial completion. How easily the Crossroads well was brought in—and a glimpse of the excitement created by the wildcat, was described by McDowell after the test:

"The well is a big producer. It kicked off when we had swabbed down only 2,300 ft., the total depth



Right: Radioactivity well log of Mid-Continent Petroleum Corp. 1 Sawyer discovery well of the Crossroads, New Mexico, pool. (Radioactivity and electric logs of the Benedum pool discovery well, 1 Alford, Upton County, Texas, also discussed here, were printed in the Journal issue of February 5, 1948, page 61). Below: Chart showing typical responses of radioactivity and electric logs. These generalized curves (Lane-Wells Co. data) illustrate the most typical response of radioactivity and electric logs to various types of formations. These typical curves, however, should not be used as criteria for the analysis of any particular log since, in practice, a wide range of response may exist


RADIOACTIVITY LOG
GEO. LOG
ELECTRICAL LOG
Gamma Ray
Neutron
RADIOACTIVITY INCREASES
Natural Potential
Shallow Penetration Resistivity
Deep Penetration Resistivity
Shales record to the right on Gamma Ray, to the left on Neutron Curves
Gamma Ray Curve normally throws to the left in sands. Neutron Curve indicates decreasing amount of fluid in sand in proportion to throw to right from shale value
Gamma Ray Curve throws to the left. Neutron Curve indicates dense portions as large deflections to the right, porous (fluid filled) portions as deflections toward shale value
Porous Streak
Porous Streak
Gamma Ray Curve deflects to the left. Neutron Curve indicates gas-fluid contact by throw toward the shale line.
Materials such as bentonite, volcanic ash, or black marine shales may have very high radioactivity and produce abnormally large deflections to the right on the Gamma Ray Curve (dotted line)
Gamma Ray Curve normally throws to the left on sands. Neutron Curve indicates decreasing amount of fluid in sand in proportion to throw to right from shale value.
Same as oil sand.
Gamma Ray Curve shows interbedded structure but moves toward sand (left) side of log.
Gamma Ray Curve deflects to left. Neutron to right indicating dense formation.
Shale
Fresh Water Sand
Shale
Limestone
Shale
Gas Sand above Salt Water Sand
Shale
Oil Sand
Shale
Salt Water Sand
Sandy Shale
Anhydrite
Shale
Shales record as low values on all electrical log curves (toward center line).
Fresh water sands most frequently show relatively low Natural Potential and high resistivity values.
Limestones record with high Natural Potential and very high resistivity values. The difference between dense and porous limestones (porous streaks) is not normally indicated on electrical logs.
Gas sands may show high resistivity and relatively low Natural Potential. Salt water sands are characterized by low values on the Deep Penetration Resistivity Curve (dotted curve).
Oil sands are characterized by relatively high values on all curves.
Salt water sands normally show relatively high values on all curves but the Deep Penetration Resistivity Curve (dotted curve).
Natural Potential and Shallow Penetration Resistivity Curves (solid curves) show finely interbedded structure but remain on shale side of log.
Hard, dense formations have high resistivities, most frequently relatively low Natural Potential values.

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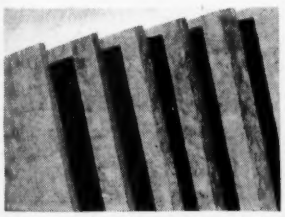

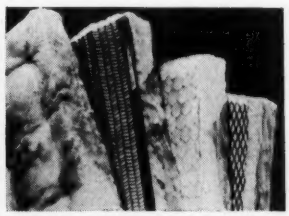

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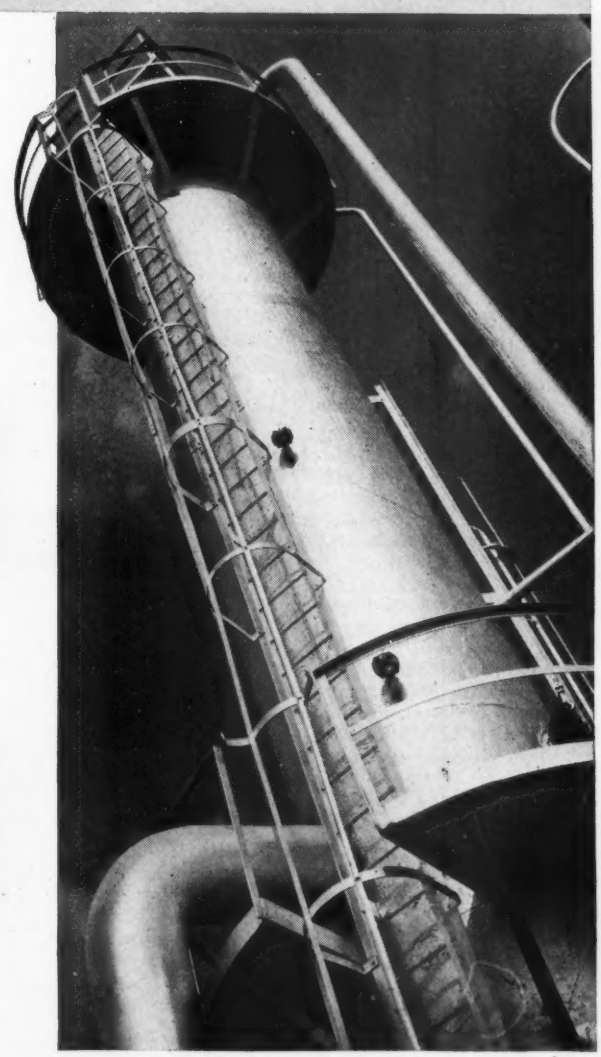

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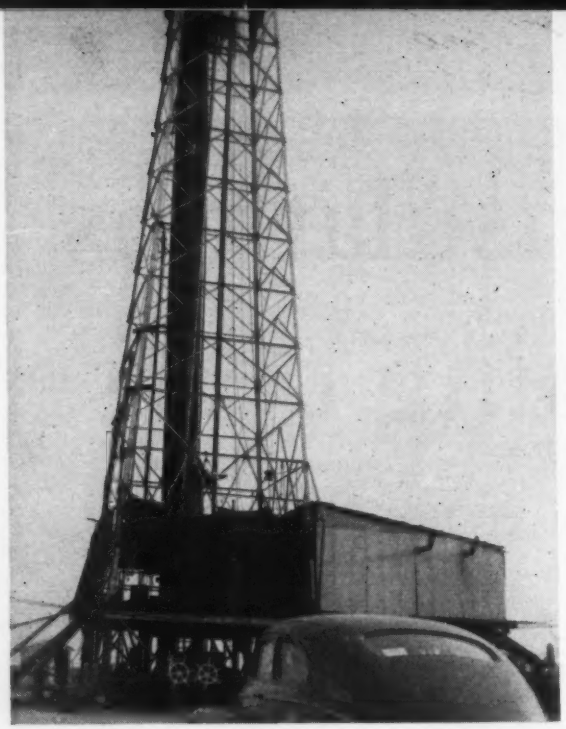

Day crew shown above for Crossroads discovery well: C. H. Clark, engine man; W. J. George, derrick man; Randolph Hyman and Charles Rackley, floormen. Others were Jim Clark, driller; and J. H. Carter, tool pusher. Evening tour crew: J. L. Taylor, driller; D. H. McGinnis, engine man; T. T. Floyd, derrick man; John W. Grice and C. H. Van Horn, floormen. Morning crew: T. H. Dooly, driller; D. V. Dooly, engine man; R. W. Dooly, derrick man; Howard E. Jennings and James Adcock, floormen

Left: Rig with 3½-in. drill pipe going into hole as it neared total depth of 12,258 ft.

being 12,285 ft., and the flow was getting stronger at the close of the 6-hour test. We had to shut the well in as the flow filled a 1,000-bbl. tank and we only have one more 1,000-bbl. tank at the well site.

"People out there really have gone crazy over the discovery. They are flocking in from all directions. The Sawyers, who own 1,200 acres on which the well is located, yesterday sold an undivided portion of their royalty, not just under the well but over the whole ranch, for $2,000 an acre." Other reports state that 106 royalty acres were involved, and the total consideration was $212,000.

On a later test, using more of the available tankage capacity, the well flowed 170 bbl. of oil in 1 hour through ¾-in. choke, and then 110 bbl. oil in 1 hour through a ½-in. choke. With the oil was a flow of 5 to 15 per cent mud, indicating considerable mud in the hole which may be interfering with flow of the oil.

Drilling and Completion

Remarkably good progress was made in drilling the well, which cost approximately $275,000. C. R. McVay and C. J. Stafford, of McVay & Stafford Drilling Co., Tulsa, reported 213 actual drilling days for their rig to reach 12,100 ft. The over-all time including rigging up was 247 days. The 13⅜-in. surface casing was cemented at 264 ft., and a 9⅝-in. intermediate string was cemented at 3,706 ft. with 280 sacks. The well originally was started for a 5,500-ft. test, but when it was decided to go deeper the additional 6,758 ft. was made without trouble or delaying fishing jobs.

The hole was started with a rig nominally rated for 5,000-ft. drilling but the contractor has this rig equipped with heavy blocks, larger mud pumps, etc., to enable it to reach 8,000 ft. without difficulty. When the Mid-Continent test reached 8,000 ft. the contractor moved in a heavier rig which was nominally rated at 7,500 ft. but equipped for 10,000-ft. depths. This 10,000-ft. rig drilled the hole to the 12,258-ft. total depth.

A 129-ft. derrick rated at 537,000 lb. was used for the job. Drill-pipe size was 3½-in., and 11 drill collars were being used in the lower portion of the hole. Salt-water mud was used with average viscosity of 43 and weight of 10.4. Only two mild chert zones were encountered in the drilling, and the formation otherwise presented no unusually difficult drilling conditions. A total of 197 bits were used in drilling the well. No rig breakdowns were involved in the job and the longest rig downtime period was to change wire lines.

Actual drilling time was 213 days to 12,100 ft. Total bits used were 197, and chert zones were comparatively mild

First drilling break or softening for the deep pay started at 12,106 ft., and to 12,143 ft. the rate averaged 30 minutes per foot, from 12,143 to 12,181 ft. the average dropped further to 15 minutes per foot.

Three drill-stem tests and two sets of cores in the 12,000-ft. interval all gave positive indication of oil, in advance of actual completion. The drill-stem tests were at 12,099-12,181 ft., 12,181-12,214 ft., and 12,214-12,249 ft. These recovered, besides the water blanket, oil-cut mud, etc., 3,150, 9,950, and 110 ft. of clean oil, successively. Flowing presure on the first two of these was 1,800 and 2,500 psi., shutin pressures after 15 minutes were 4,750 and 4,800 psi.

For the cores, the one 12,181 to 12,214 ft. recovered 32 ft. of dolomite, medium crystalline, creamy to white, with traces of intercrystalline porosity The entire core was highly fractured, and carried porosity ranging from fine to cavernous (holes up to 1 in.) and a lot of fracture plane porosity. Core had oil odor and stain. The core 12,214-49 ft. recovered 33 ft. of medium crystalline, gray dolomite, with a little intercrystalline porosity carrying stain. The entire core was highly fractured and full of vug holes.

After perforating, 1 Sawyer was washed with 1,000 gal. of mud acid and then swabbed into the pits to kick off.

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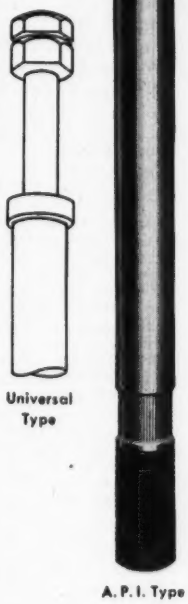

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Legal Aspects of the Unitization Of Oil and Gas Fields

*by Raymond M. Myers**

THE consolidation of all leases in a field, or a substantial portion thereof, is generally referred to as "unitization," as distinguished from the word "pooling" which is applied to the consolidation of leases or parts of leases covering small tracts. We are here concerned with unitization as so understood. Spacing and pooling have been discussed elsewhere.[1]

Unitization may be used for salt-water disposal, oil production in an oil field, water flooding,[2] gas production, cycling operations,[3,4] pressure maintenance, storage, or combinations of such purposes. Without it some of the operations mentioned are impossible. As has been pointed out, a common pool or field is a unit by nature and the pressures therein, whether hydrostatic or gas, are common to the whole reservoir. The position of oil and gas in the pool does not, of course, follow property lines, and therefore to adhere to property lines in their development is to drill unnecessary wells and to produce oil and gas with the maximum waste and the minimum of efficiency.

Large economies result through avoiding duplication of equipment, operating costs, and the drilling of unnecessary wells, through more centralized management, and in many other ways. Increased recoveries inure, of course, to the benefit of lessor and lessee alike.

Voluntary Unitization—Provisions in Leases

While waiting for more enlightened statutes providing for enforced unitization, the operators in many states have for many years accomplished, or attempted to accomplish, the same purpose by voluntary agreements.

Leases may be unitized by the joinder of the landowners in a community lease which by its very terms constitutes a form of unitization. It has been held also that contiguous leases may just as effectively be communitized where all the landowners sign together an ordinary lease and it does not appear that the lessors did not intend to pool the leases.[4] There are many unanswered problems relating to community leases, at least in Texas, and it would seem preferable to approach the problem frankly with a unitization agreement.

*Legal department, Magnolia Petroleum Co., Dallas.

The pooling of small tracts by a provision in an oil and gas lease has been very successful, but as yet no successful attempt has been made to unitize a field by the use of a provision in a lease. Due to the complexity of the unitization agreement, it is difficult to include in an ordinary oil and gas lease a clause that would be sufficiently broad in its scope to take the place of a unitization agreement. In most cases it would be tantamount to a general power of attorney to a lessee to execute a unitization agreement for the royalty owner. In Glassmire, "Oil and Gas Leases and Royalties," second edition, page 402, is a suggested clause.

However, in those states that have statutes providing for enforced unitization, the problem is much simpler. In Oklahoma, for instance, the following provision, suggested by R. T. Wilkinson, Jr., might be used:

"If the Corporation Commission of the State of Oklahoma or other regulatory body having jurisdiction in the premises shall enter an order establishing an area, or approving a plan for the development of an area, as a unit for the production of oil, gas, or any other mineral covered by this lease, and such area includes this lease, the land covered by it, or any part thereof or any horizon or formation thereunder or part thereof, and if by such order or approved plan of development the leasehold estate or any part thereof created by this lease will be or is required to be developed and operated as a part of such unit in accordance with such order or approved plan of development, then drilling operations and production on any part of the unit area shall be considered as drilling operations and production on the land covered by this lease whether the well or wells are actually located thereon or not, and the entire unit area shall be treated for all purposes, except as to the payment of royalties on production, as if it were included in this lease. In lieu of royalties payable under this lease on production from land covered by it that may be included in a unit area, lessor shall be paid the royalty above provided only on the share of production from the unit allocated to this lease or that part thereof included in the unit by such order or approved plan of development. The provisions hereof shall apply to any change in a unit, reforming, increasing, or decreasing it if approved by the Corporation Commission or other regulatory body having jurisdiction in the premises."

No authorities have been found with reference to a clause in an oil and gas lease authorizing field-wide unitization, but the pooling clause in oil and gas leases has been before the courts in several cases.

In the exercise of the powers given in a pooling clause in an oil and gas lease, it has been held that the lessee must use good faith. This means, among other things, that lessor's productive land cannt be pooled with unproductive land to the disadvantage of lessor.[5] The power to pool must be exercised within the terms of the authorization.[6]

Voluntary Agreements

Voluntary agreements of one kind or another have been used for many years in consolidating leases into units, field-wide in their scope. These agreements have been found particularly useful in recent years, with the advent of gas distillate fields.

One who has not had experience in developing a unit cannot possibly appreciate the tremendous amount of effort that goes into the consummation of the program. Extensive work must be done by petroleum engineers and geologists to determine the feasibility of the operation. It is often difficult to determine whether or not the field should be unitized in its early stages or should first be extensively developed. There are dangers inherent in either plan. If it is developed too early it is impossible to exactly outline the producing area, whereas, if it is extensively developed it is more difficult to satisfy the various interests involved. The large number of operators in the field must first be convinced of its feasibility and then, through prolonged discussion and argument, the contract is evolved, with a nice balancing of rights and values. Then comes the problem of obtaining the signatures of royalty owners, who are often unacquainted with the benefits of unit operation.

Among the many voluntary agreements now in effect or in the process of completion, those covering the following fields may be mentioned as examples:

Chesterville field, Colorado County, Texas; La Gloria field, Jim Wells and Brooks counties, Texas; Katy field, Waller, Harris, and Fort Bend counties, Texas; Old Ocean field, Brazoria and Matagorda counties, Texas.

Details of Agreement

Since contracts vary in their content, no one may be regarded as so typical that it could apply to all, but contracts covering the above fields have been placed on record and may be consulted for their details. There are certain provisions, however,

that may be regarded as common to all.

The contract should set out its purpose, which is to establish a unit plan of development and operation for the field, to prevent waste, to recover the maximum amount of gas and other hydrocarbons, to erect a plant, if feasible, to return gas to a gas-producing formation in the field, and to divide fairly the revenues among the parties.

All words used in the contract should be carefully defined. The unit must be outlined. This is often arrived at by trading and negotiation among the parties, even after the geologists have made their finding as to the limits of the field. "Unitized substances" must be defined, as it may include gas with its constituent elements, or oil and gas, or in some cases oil and casinghead gas only.

In some cases assignments are exchanged among operators to achieve unitization, but this would not seem to be necessary if the contract is so worded that each operator obtains tracts in the unit.

Allocation of the unitized substances among tracts may be based on surface acres, on acre-feet of sand, upon reserves, or upon some other basis as agreed upon.

The ideal of allocation is to give to each operator and royalty owner his fair share of the unitized substances. It is important, for the reasons hereinafter discussed, that the agreement should provide for allocation to the tracts and delivery in kind to the operator of his portion of the unitized substances. Out of the allocation made to him each operator may account to his own royalty owners on the basis set out in the basic oil and gas lease as modified by the unitization agreement.

Existing wells must be purchased by nonowners so that the wells may be owned by the operators in proportion to their ownership of the unitized substances. Whether a plant is to be erected must be determined. This plant is built and operated under the supervision of the operators' committee, is directly operated by the unit operator, and is owned by the operators in proportion to their ownership of the unitized substances. Some plants are owned and operated by outside parties who process gas from the unit under a contract which also provides for the reinjection of the residue gas into horizons beneath the unit.

Provisions must be made for handling of nonunitized substances. For instance, if the unit is formed to handle gas, then provision must be made for handling oil, if any is discovered within the unit.

Provision is made for the perpetuation of the leases by production of unitized substances at any point in the unit. The unit agreement usually supersedes the oil and gas leases with reference to royalties, the production of oil from the unit, the return of residue gas, and such other matters as may be covered in the unit agreement.

An operators' committee is created and provision for its organization and powers is included. A unit operator is designated and his powers outlined.

Other provisions have to do with taxes, the examination of titles, the extension of the participating area, the time when the contract becomes effective, etc. Royalty owners must be protected against the payment of operating expenses.

Per Cent to Effect Agreement

Unit agreements usually provide that the agreement shall become effective when operators owning a prescribed per cent of the participating area and royalty owners owning a prescribed per cent of the participating royalty have signed the agreement. It is, of course, hoped that after the unit goes into effect the remaining interest holders may be persuaded to sign the agreement. It is extremely difficult, however, to obtain the signatures of all royalty owners and the lessees are without power to consolidate the royalty interests of their lessors in the absence of statutory authority.[8]

In cases where units go into effect without the signatures of some of the royalty owners, many problems arise in the operation and development of the unit. Thus, some royalty owners are paid under the lease provisions and others in accordance with the unit provisions. In some cases the perpetuation of leases may influence the location of the unit wells. In every unit that is not completely unitized, the difficulties encountered emphasize the necessity of some form of enforced unitization. Since the unanimous consent of all operators and royalty owners is necessary to completely unitize under a voluntary agreement, the very small minority of interest holders who refuse to sign the agreement, whether for selfish or other reasons, causes considerable difficulty.

Provision is made for the execution of the contract in counterparts. It is often advisable in order to save recording fees to have the royalty owners execute a short ratification agreement.

A nonparticipating royalty owner must sign the unitization agreement in order to be bound; the right to lease does not include the right to pool.[8] The same is true of holders of oil payments or other interest in the oil and gas being unitized.

Guardians of minors and persons of unsound mind are authorized to execute unit agreements, but for gas development only,[9] and the land commissioner is similarly limited with reference to public school lands.[10] The Texas Trust Act[11] authorizes a trustee to execute unitization agreements. Legislation is needed to broaden the power of the state and all fiduciaries to enter into such agreements.

The nature of the relationship between the parties to a unitization agreement is illustrated in those cases holding that all owners of royalty interests in a unit are necessary parties to a suit involving one of the tracts included in the unit, since all lessors in the unit have the right to participate in the royalty from the oil and gas produced from said tract.[12]

Encouragement is given the proponents of voluntary unitization by the decision in Tide Water Associated Oil Co. v. Stott.[13] Here plaintiffs owning royalty under lands leased to defendants sued for damages caused by drainage due to the operation of cycling on adjacent unitized lands. Plaintiffs were denied damages because of their refusal to come into the unit on the same basis as other royalty owners in the unit, it being found that cycling was not practical without unitization.

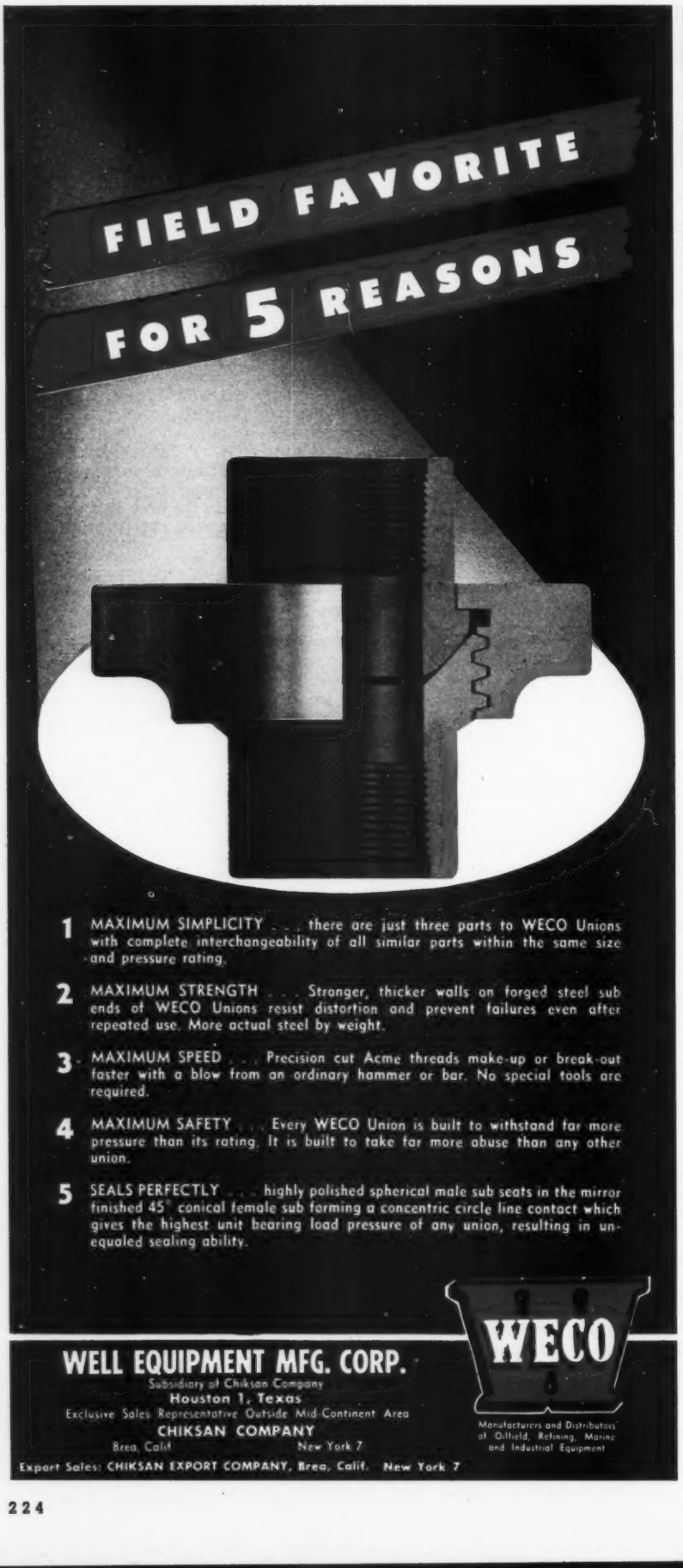
Enforced Unitization

While the State of Texas does not have laws providing for enforced unitization, the Railroad Commission, under its power to prevent waste and protect correlative rights, has in some cases, through its orders, achieved some of the good results of unitization.[14]

Field-wide unitization unquestionably prevents waste, protects correlative rights, prevents the drilling of unnecessary wells, increases the recovery of oil and gas, and generally is an economic boon to operators and royalty owners. Its achievement is so important that enforced unitization by a democratic procedure is necessary and desirable. The states of Alabama, Florida, Georgia, Louisiana, and Oklahoma have statutes which approach compulsion, especially with reference to cycling.

Typical of provisions providing for the enforced unitization of a field to cycle gas is that found in Louisiana's law.[15] Under this authority orders have been issued, including Order No. 10-C promulgated January 26, 1941, covering Cotton Valley field, Webster Parish, Louisiana. The operators had, prior to the issuance of the order, drawn a voluntary agreement and it had been largely executed. Orders have been issued in the case of South Jennings field, Jefferson Davis Parish; Mamou field, Evangeline Parish, and others.

The best law covering field-wide unitization is found in Oklahoma.[16] This statute, covering the unitized management of common sources of supply, is compulsory only in part, as the commission does not take jurisdiction except upon the petition of lessees of record of 50 per cent or more of the area of the common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source of supply, and is based generally upon the rule of the majority. Lessees of record of 15 per cent or more of the unit area or proposed unit area may veto the plan. However, this has not been found to be too great an obstacle to the unitization of fields in that state.

This law provides for a finding on the part of the commission of the feasibility of the project, and sets out what the order must contain. The provisions of the unit agreement are in general similar to voluntary agreements, as herein discussed. The nature, purposes and functions of the unit and the liability of owners of oil and gas rights therein are provided for in the order. Provisions for amendments and enlargement of the unit are also included. Royalty and leasehold equities are adjudicated.

Under this law orders have been issued creating units in West Cement field in Caddo County, Oklahoma; West Edmond field in Oklahoma, Logan, Kingfisher, and Canadian counties; Southwest Antioch field in Garvin County, Oklahoma, and other applications are pending. An appeal from the order of the Corporation Commission creating the West Cement Unit has been perfected to the Supreme Court. The constitutionality of the law is directly involved. The sanction by the courts of this statute would be a great boon to the industry and to conservation authorities alike.[17]

It is believed that these orders will be upheld by the courts. The power of regulatory bodies to require pooling of small tracts in order to conform to prescribed spacing patterns for the purpose of preventing waste, protecting correlative rights, removing fire hazards and other dangers has been upheld in federal as well as state courts.[18]

Enforced pooling in Oklahoma was upheld in the case of Patterson v. Stanolind Oil & Gas Co.[19]

The Louisiana act providing for the establishment of drilling units has been upheld.[20]

The enforced pooling of small tracts differs little in principle from enforced pooling of an entire field, and the amount of the acreage involved should have little significance.

The Louisiana act providing for field-wide unitization for the purpose of cycling in a case involving the Cotton Valley Unit has been upheld against the contention among others that an exercise by the state of its police power in this case constituted denial of due process of law in that the obligations of a previously executed contract (a lease) were impaired.[21]

Antitrust Laws

Fear of prosecution under the federal and state antitrust laws[22] has been in some cases advanced as the reason for not entering into voluntary unitization agreements.

As a general rule, we believe it may safely be said that the activities of operators under a unit agreement confined to the purposes above mentioned cannot be considered as cooperative activities forbidden by these laws. The activities that have been condemned have to do with prices and the restriction of production for the purpose of limiting competition.[23] The regulation by agreement of the output of plants, etc., is sometimes used as a means of suppressing competition and as such is condemned.[24] However, it has been held in Texas that restriction of production by allocation and by limitation to market demand is a valid exercise of authority by the Railroad Commission[25] and the restriction of production for conservation purposes under the police power has been upheld generally.[26] It would seem that if the operators in the unit would carefully avoid agreements, written or oral, in respect to prices or the restriction of output for any reason except the legitimate purpose of conservation, then there need be no fear of prosecution under the antitrust laws of the state and nation.

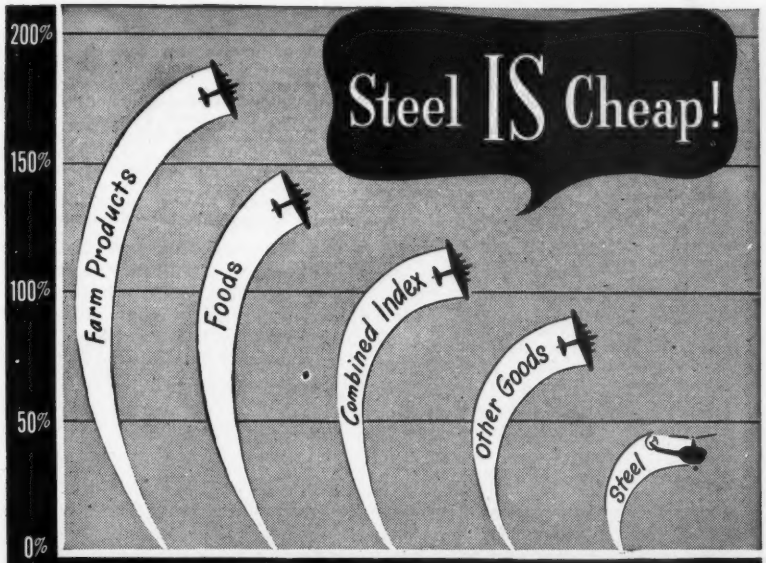
The only case involving a unitized operation that has been filed under the federal antitrust laws is the case of United States v. Cotton Valley Operators Committee, filed on June 20, 1946, in the United States District Court of the Western District of Louisiana at Shreveport, being Civil Action No. 2209, and now pending in that court.

The operators in Cotton Valley field, prior to July 2, 1940, with a few exceptions, executed or ratified the Cotton Valley Unitization and Pressure Maintenance Agreement covering certain sands in said field.

Said operators, as set out in Article XI of said agreement, obligated themselves to construct and install a "recycling, pressure-maintenance, and liquid-hydrocarbon extraction and processing plant," and this plant was in fact constructed and was placed in operation on January 15, 1941, and by November 1946 gas was being processed to produce propane, butanes, gasoline, and other liquid hydrocarbons, as authorized by Section 2 of Order No. 10-C, hereinafter set out.

On July 1, 1940, by its Order No. 10-B, the Department of Conservation of the State of Louisiana found that said contract was fair and reasonable, was conducive to conservation, the prevention of waste, and the obtaining of the greatest ultimate recovery, and approved the same and specifically authorized and permitted the operators and royalty owners to conduct all operations contemplated thereby.

Subsequently, on January 28, 1941, the Department of Conservation of the State of Louisiana, after notice and full hearing, and under the authority of Act 157 of 1940, issued its



NO ZOOM In Steel Price Rises!

U. S. Department of Commerce And Council of Economic Advisors Report Steel Price Increases Have Been Moderate

Recently the steel industry was again brought up to the whipping post.

After a terrific tongue lashing, the Government set in motion three investigations to determine whether more punishment should be administered.

The Department of Justice found no evidence of collusion.

The Department of Commerce reports steel price advances have been more moderate than in other lines.

The Council of Economic Advisors admits steel price increases have been less than those for manufactured articles, agricultural products, wages and material costs.

How moderate — how much less have been the increases in steel prices is shown in the chart above. It is based upon Government indexes of wholesale prices of various commodities as compared to steel mill products and shows the price increases from 1939 to February of 1948.

Comparison of steel prices to the prices of virtually any other components of the national income shows the irrefutable fact that the steel industry has held a taut line on steel prices and that the most wanted and most essential of metals — **Steel IS Cheap.**

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Order No. 10-C, effective February 1, 1941, unitizing Cotton Valley field. Section 2 of said order read as follows:

"That in order to prevent waste, to avoid the drilling of unnecessary wells, to reasonably maintain reservoir energy and to obtain the greatest ultimate recovery, it is advisable, expedient, and necessary that there be a unit plan of operation for development and production purposes, and accordingly, said areas shall be treated as one lease, one property and one tract, and all oil, gas and other hydrocarbons within said areas, as the same may now be fixed or subsequently enlarged, are as to each of said areas hereby unitized, and the lands, royalties and lease interests containing same are hereby pooled and communized; and, after the separation or extraction of liquid hydrocarbons, all gas produced therefrom in excess of the market demand shall be returned to the formations from which produced, less that amount thereof as is utilized or unavoidably lost in recycling operations, and the extraction of distillate, gasoline or other liquid hydrocarbons; the Cotton Valley Operators Committee, as established by that certain agreement executed by The Ohio Oil Co. et al, as Operators, with and to E. L. Stewart et al, as Royalty Owners, and filed under Register No. 75063, Conveyance Records of Webster Parish, Louisiana, being hereby designated as the Operator of said unitized and pooled areas."

The Supreme Court of Louisiana, in the case of Crichton v. Lee, cited above, after setting out the facts above stated, held that Order No. 10-C was the proper exercise of the police power of the State of Louisiana for a public purpose and held the order constitutional.

The complaint filed by the United States against Cotton Valley Operators Committee, above mentioned, charges that the defendants illegally combined and conspired, by a continuing agreement and concert of action, in that they did:

"(a) Agree to jointly engage in and exclude others from the business of extracting, processing and refining various separate hydrocarbons and hydrocarbon products from over 85 per cent of the natural flow of liquid and gaseous hydrocarbons produced from said field and not reinjected therein, which said business of extracting, processing and refining was in addition to that required to separate said hydrocarbons from said natural flow or to reinject the residue thereof into the field;

"(b) Agree to jointly engage in and exclude others from the business of distributing and selling all of the hydrocarbons and hydrocarbon products jointly extracted, processed or refined by the defendants from over 85 per cent of the natural flow of liquid and gaseous hydrocarbons produced from the field and not reinjected therein.

"(c) Agree to jointly sell through channels of distribution jointly selected by the defendants all of the hydrocarbons and hydrocarbon products extracted, processed or refined by the defendants from over 85 per cent of the natural flow of liquid and gaseous hydrocarbons produced from the field and not reinjected therein.

"(d) Agree upon fixed and uniform prices and terms and conditions of sale for each of the hydrocarbons and hydrocarbon products extracted, processed or refined by the defendants from over 85 per cent of the natural flow of liquid and gaseous hydrocarbons produced from the field and not reinjected therein, and agree to sell each of said hydrocarbons and hydrocarbon products at the said fixed and uniform prices and upon said terms and conditions of sale."

The Department of Justice, in a newspaper statement issued on June 17, 1946, quotes the United States attorney general as follows:

"This suit does not attack .... any activity which is necessary or essential to the conservation of natural resources or the prevention of waste."

In a letter to Earl Foster, secretary of the Interstate Oil Compact Commission, the attorney general refers to the above statement and says further:

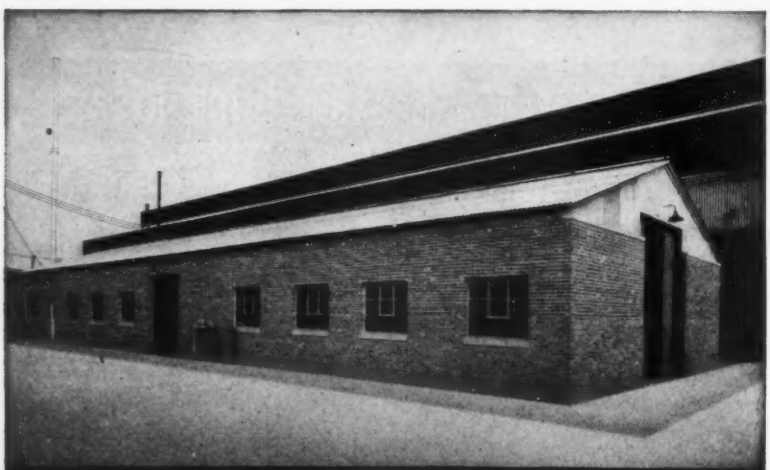
"The Department, however, does attack the practice of jointly processing, refining and joint sale of the products removed from the wet gas through agreed upon trade channels at fixed prices to the exclusion of others from engaging in such business and the elimination of competition, which are incontrovertedly illegal. The complaint in this suit does not attack the Cotton Valley Unitization and Pressure Maintenance Agreement, but it does attack those practices which go beyond the lawful operations approved by the Commissioner of Conservation under the statutes of the State of Louisiana."

In his speech before the Interstate Oil Compact Commission in Dallas in December 1946, the attorney general restated, in a general way, the same position.

It is evident from the above facts that the validity of Orders 10-B and 10-C will be at issue in this case, insofar as those orders cover some of the activities alleged in the complaint to be illegal.

The extent to which the order is attacked of course remains to be seen. Certain other activities alleged to be illegal are not within the terms of the order.

From an examination of the known facts and issues in this case, it may



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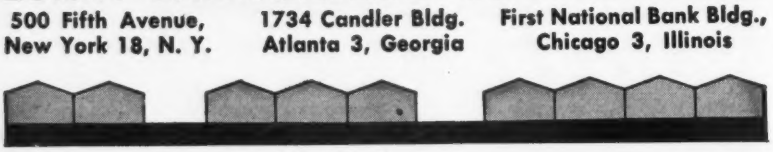

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reasonably be concluded that the attorney general would not attempt to prosecute those operators in a field, who, under a unitization agreement or a conservation order, produce oil or gas, extract condensate from the gas, and reinject the residue gas for repressuring or pressure maintenance purposes. It appears that these operations are not alleged to be unlawful in the Cotton Valley suit.

In the case of Parker v. Brown[27] the question was raised as to whether or not the California Agricultural Prorate Act was rendered invalid by the Sherman Act. Under this act a program was set up, against which a raisin grower complained. In holding that the program did not violate the antitrust law, the court said:

"But it is plain that the prorate program here was never intended to operate by force of individual agreement or combination. It derived its authority and its efficacy from the legislative command of the state and was not intended to operate or become effective without that command. We find nothing in the language of the Sherman Act or in its history which suggests that its purpose was to restrain a state or its officers or agents from activities directed by its legislature . . . .

"There is no suggestion of a purpose to restrain state action in the Act's legislative history . . . .

". . . It is the state which has created the machinery for establishing the prorate program."

No case has arisen testing a unitization agreement under state antitrust laws. The attitude of the attorney general of Texas was obtained when he was asked to pass on the legality of H. B. 67 introduced in the Texas Legislature in 1947. This bill had for its purpose the protection of operators against state antitrust laws where engaged in joint operations set out in the act. The attorney general thought the act too broad in its scope, but said in part:

"In considering the reasonableness of the exceptions to the antitrust laws made by H. B. 67, and also considering the constitutional questions of freedom of contract and due process, the courts will undoubtedly look to reasoning and holding of decisions which have upheld statutes and orders requiring compulsory pooling of oil and gas properties. Four of the states bordering Texas allow such compulsory pooling. The states are Louisiana (R. S. 1940, P. 610; Act. 157, Sec. 9a); New Mexico (Laws 1935, Ch. 72, p. 137, Sec. 12; N. M. Stat. Anno. official ed. Sec. 69-213); Oklahoma (Laws 1945, p. 157, Sec. 4, amending Title 52, Sec. 87, Laws 1941); and Arkansas (Laws 1939, Act 105, Sec. 15, as amended by Act 86, 1941).

"Without considering the effect on the antitrust laws, forced pooling has been upheld in these states. Patterson v. Stanolind O. & G. Co. (1939), 305 U. S. 376, affirming the Oklahoma Supreme Court, 77 P. (2d) 83, noted with approval 16 Tex. L. Rev. 597, 37 Mich. L. Rev. 955 and 2 La. L. Rev. 191; Placid Oil Co. v. North Central Tex. Oil Co. (La. Sup. 1944), 19 So. (2d) 616; Hunter Co. v. McHugh, (La. Sup. 1942), 11 So. (2d) 495, noted 16 Tulane L. Rev. 477, (Upholding a compulsory unitization allowing only one gas well to each 320 acres); Croxton v. Oklahoma (1939), 97 P. (2d) 11; Marrs v. City of Oxford, 32 F. (2d) 134 (CCA 8th 1929) cert. den. 280 U. S. 573. A three-judge Federal District Court upheld compulsory pooling under a city ordinance in the South Houston field. Tysco Oil Co. v. Railroad Commission (1935) 12 F. Supp. 195.

"The text writers are almost uniformly of the view that pooling of natural resources is desirable from the standpoint of conservation and the protection of correlative rights. 1 Summers, Oil and Gas 275 Sec. 104; Walker, "The Problems of the Small Tract Under Spacing Regulations," 17 Tex. L. Rev. (Bar No.) 157, 169; Ely, "The Conservation of Oil," 51 Harv. L. Rev. 1209, 1235; German, "Compulsory Unit Operations of Oil Pools," 17 A.B.A. Journal 393; and Moses, "Some Legal and Economical Aspects of Unit Operations," 21 Tex. L. Rev. 748, 765. Only the last mentioned article deals with the antitrust problem.

"Under the above authorities, because of the peculiar nature of oil and gas as natural resources, we are of the opinion that an exception to the antitrust laws allowing voluntary pooling by both lessors and lessees, based solely on the necessity of same for conservation of natural resources, the prevention of waste, and the protection of correlative rights, would probably be upheld by the Courts as valid and reasonable; and as such, would not endanger the validity of the antitrust laws. It is understood that such was the only intent of the author of this bill. From a discussion of the bill with the author we learn that its primary purpose is to recognize as lawful any pooling agreements necessary for operators (1) to have a unit large enough to meet Railroad Commission spacing rules, (2) to establish units necessary to effect secondary recoveries through repressure methods, water flooding, and pressure maintenance; and (3) to establish a cooperative gas recycling system for a field in order to strip the wet gas and other hydrocarbons, and return the dry gas to the sands by common input wells.

"If this bill were limited to the above operations, and agreements thereunder were made lawful only when reasonably necessary for prevention of waste, conser-

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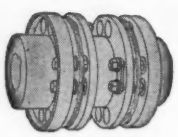
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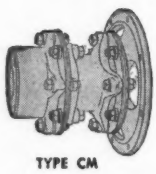
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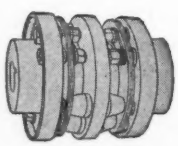
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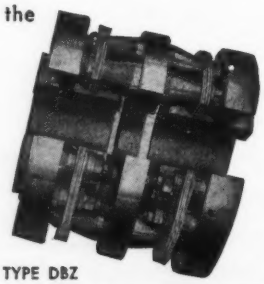
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vation of oil and gas, and protection of correlative rights, (such necessity to be determined by the Railroad Commission upon application, notice and hearing) then it is our opinion that the bill would not constitute an unreasonable or arbitrary exception to the antitrust laws and would not invalidate or endanger future enforcement thereof. . . ."

The purpose of H. B. 67 was evidently to allay the real or fancied fears of those who refused to enter into unitization agreements because of the Texas antitrust laws. Legislation, both state and federal, which would thus exempt these activities would for this reason be a great encouragement to the creation of more units for the purposes here discussed. This has been done in Mississippi by a statute to the effect that these agreements do not violate the antitrust laws of Mississippi when such agreements are approved by the State Oil and Gas Board.[28] Similar statutes have also been passed in Oklahoma,[29] and Arkansas,[30] among other states.

Under Texas statutes[31] operators are authorized, subject to the approval of the attorney general, to enter into agreements for the cooperative development of gas fields. This statute is probably no protection against prosecution under the antitrust laws as the attorney general, in approving such contracts, merely says that they do not violate the conservation laws.

Parties to unitization agreements will not, of course, be protected simply because they have reduced their purposes to writing, if, as a matter of fact, in their meetings, discussions and activities they make use of their association to violate the law.

The Federal Income-Tax Law

The objection has been raised that under a unit agreement the operators form themselves into an association taxable as a corporation under the Federal Income Tax Law. If so held, not only would the unit be taxed as a corporation, but all payments made to interest holders would be considered dividends and taxable as income to the recipients.

Numerous cases have held that when coowners of an oil and gas lease enter into an operating contract for the development and operation of a coowned property, a joint adventure partnership results, not an association.[32]

The Circuit Court of Appeals said in the case of Commissioner of Internal Revenue v. Rector & Davidson:[33]

". . . The Supreme Court recognized five salient features of a corporation in the case of Morrissey v. Commissioner, 296 U.S. 344, 56 S. Ct. 289, 80 L. Ed. 263. They are (1) title to the property held by the entity, (2) centralized management, (3) continuity uninterrupted by deaths among the beneficial owners, (4) transfer of interest without affecting the continuity of the enterprise, and (5) limitation of the personal liability of participants."

Title to the leases constituting a unit does not pass to the unit, but

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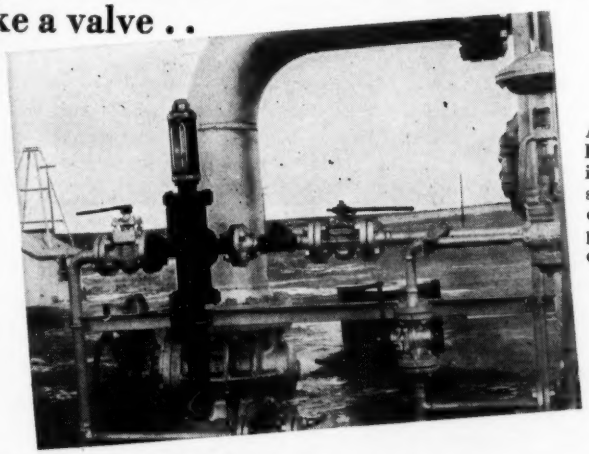

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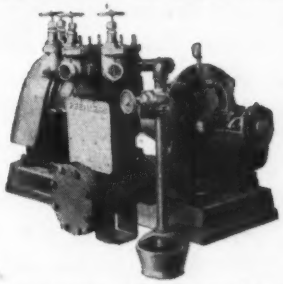

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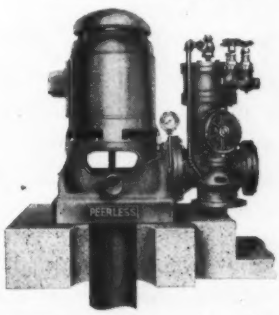

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These features and others that are apparent from a consideration of the provisions of a unit contract clearly indicate that a unit is not such an association as is taxable as a corporation under the income tax law.

A unit agrement similar to the one discussed above had not been before the courts until the commissioner of internal revenue attempted to hold the East Alice (Texas) Unit taxable as a corporation. After extended negotiations, the commissioner stipulated with the taxpayers that the unit was not so taxable and the Tax Court, on November 18, 1946, entered an order carrying said stipulation into effect. Following this happy disposition of the case, there should be no further objection to unitization on this ground.

Unitization of Public Lands

One-fifth of the land within the boundaries of the United States is owned by the federal Government. The Government has maintained a policy of reserving the minerals in land sold by it, and since government oil and gas leases cover over 3 million acres of land, it becomes very important to discuss unitization as it affects the public domain.

The Constitution of the United States grants to Congress the power "to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States."[34]

In Summers, Oil and Gas, the author says:

"The production of oil and gas from the public domain of the United States is governed by Acts of Congress and the regulations of the Department of the Interior. The present law consists of the Minerals Leasing Act of 1920,[35] its subsequent amendments, and the act providing for the leasing of Naval petroleum reserves."[36]

All federal statutes regulating the production and transportation of oil and gas are found in Chapter 29 of Summers, Oil and Gas.[37]

Under the law and regulations, all leases granted on public lands may be forfeited and canceled by judicial proceedings for failure of the lessee to comply with the various sections of the act, the terms of the lease or the regulations of the secretary of the interior promulgated under the Act.

It is thus seen that the United States Government controls leases on its public lands not only by virtue of the authority as outlined above but also because of its contractual rights as set out in the leases.

From the authorities above cited, it should be concluded that the United States Government, through the secretary of the interior, has the power and authority to issue rules and regulations with reference to all conservation matters affecting public lands and that these regulations would prevail even if in conflict with otherwise applicable state conservation statutes and regulations.

The secretary of the interior is authorized by statute to approve unitization agreements and may provide that oil and gas leases issued after August 8, 1946, under certain stated statutes, shall contain a provision requiring the lessee to operate under a reasonable cooperative or unit plan and the secretary if interior may prescribe such a plan which shall adequately protect the rights of all parties in interest, including the United States.[38]

A hearing of several days' duration was held in Denver, beginning November 17, 1943, for the purpose of adopting regulations for the development and operation as a unit of oil and gas fields involving public lands. The department of the interior and the Geological Survey submitted proposed regulations and a proposed form of unit agreement. Opposition

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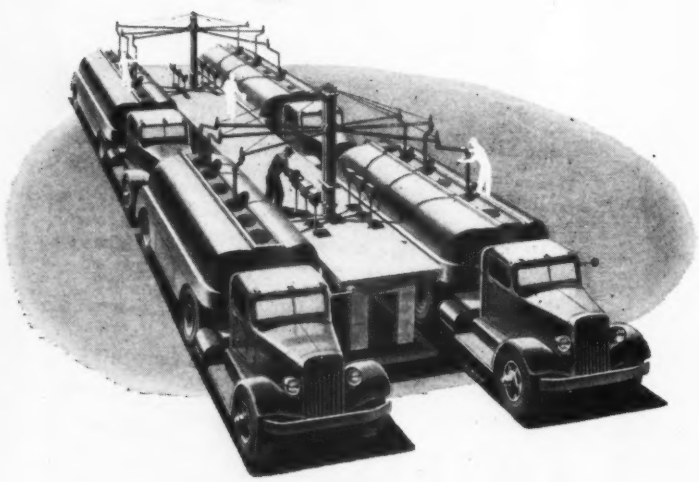

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developed at the hearing and a long delay ensued, but regulations, together with a suggested form of unit agreement, have now been issued.[39] The suggested form is said not to be compulsory and that wide latitude is given the industry in drafting unit agreements.

It was stated at the Denver meeting that the difficulties encountered in unitizing public lands included, among other things, the insistence of the Government, though only a royalty owner, that it dictate the terms of the unit agreement. The feeling on the part of the state concerned was that its conservation laws should govern, especially where state land is involved. The general difficulty of dealing with local agents of limited authority was also expressed. The answer of the Government was that the law required supervision of the secretary of the interior and that the agents are only doing their duty.

Conclusion

It is clear that, within the necessary limitations of space, this subject cannot be exhaustively treated here and that some of its important phases can be touched on but lightly. It is hoped, however, that these points have been made:

1. That there are no serious legal objections to unitization;
2. That unitization is necessary to prevent the waste of irreplaceable oil and gas, to increase their ultimate recovery, and to produce them more efficiently;
3. That it is important that operators and royalty owners be advised that these things are true, and that they normally result in increased returns to all concerned;
4. That the states having such natural resources should, in the exercise of their police power, promptly pass the laws that are necessary to insure that these important operations are properly carried out; and
5. The "know how" for negotiating unitization projects is slowly spreading, but the rapidity of its progress depends upon understanding and experience.

References

1. See Walker, The Problem of the Small Tract Under Spacing Regulations (1938), Texas Law Review (Bar Association Number) 157; Hardwicke, Oil Conservation: Statutes, Administration, and Court Review, 13 Miss. L. J. 381; Myers, Spacing, Pooling and Field-wide Unitization, 18 Miss. L. J. 267 (March 1947). King, Pooling and Unitization, 46 Mich. L. Rev. 311 (1948).

2. Brown and Myers, Water Flooding—Some Legal Aspects (1946), 24 Tex. L. Rev. 456.

3. H. P. Pressler, Jr., Legal Problems Involved in Cycling Gas, 24 Tex. L. Rev. 19 (Dec. 1945). Extensive and valuable work has been done in all phases of unitization by Robert E. Hardwicke and by the Legal Committee of the Interstate Oil Compact Commission. See R. M. Williams, Legal Aspects of Unitization, Interstate Oil Compact Quarterly Bulletin, Dec. 1947, p. 58.

4. French v. George, 159 S. W. 2d 566 (writ of error refused); Lusk et al. v. Green et al., 245 Pac. 636; Parker v. Parker, 144 S. W. 2d 303.

5. Imes v. Globe Oil & Ref. Co., 184 Okla. 79, 84 P. 2d 1106 (1938).
6. Schlittler v. Smith, 128 Tex. 628, 101 S. W. 2d 543 (1937).
7. Knight v. Chicago Corp., 188 S. W. 2d 564 (Tex. 1945).
8. Brown v. Smith, 174 S. W. 2d 43 (Sup. Ct. 1943).
9. Art. 4192a, R. C. S. (1945).
10. Art. 5368b, R. C. S. (1945).
11. Art. 7425b, 7425g, R. C. S. (1943).
12. Veal v. Thomason, 159 S. W. 2d 472 (Sup. Ct. 1942); Belt v. Texas Co., 175 S. W. 2d 622 (Amarillo Ct. of Civ. App. 1943).
13. 159 F. 2d 174 (C. C. A. 5th 1946), cert. denied, 67 Sup. Ct. 1306.
14. See H. P. Pressler, Jr., Legal Problems Involved in Cycling Gas, 24 Tex. L. Rev. 19 (Dec. 1945); see also various orders of the Railroad Commission affecting the Agua Dulce field, Nueces County, Texas; see also discussion in Brown and Myers, Water Flooding—Some Legal Aspects (1946), 24 Tex. L. Rev. 456.
15. Louisiana Acts 1940, No. 157, sec. 4 (b).
16. Oklahoma Statutes, Annotated, Title 52, Sec. 286 et seq.
17. See The Oil and Gas Journal, Dec. 7, 1946, p. 80.
18. Marblehead Land Co. v. City of Los Angeles, 47 F. 2d 528 (C. C. A. 9th 1931), cert. denied, 284 U. S. 634 (1931); Marrs v. City of Oxford, 32 F. 2d 134 (C. C. A. 8th 1929), cert. denied, 280 U. S. 573 (1929); Tysco Oil Co. v. Railroad Commission, 12 F. Supp. 195 (S. D. Tex. 1935), and Companion case of same name, id. at 202.
19. 182 Okla. 155, 77 P. 2d 83 (1938), appeal dismissed, 305 U. S. 376 (1939); see also Croxton v. State, 186 Okla. 249, 97 P. 2d 11 (1939).
20. Hunter Co., Inc., v. McHugh, 11 So. 2d 495 (1942), 320 U. S. 222 (1943); Alston v. Southern Production Co., Inc., 21 So. 2d 383 (1945).
21. Crichton v. Lee, 209 La. 561, 25 So. 2d 229 (1946).
22. Federal: 15 U.S.C.A. Secs. 1-7 (Sherman Antitrust Act of 1890); 28 U.S.C.A. secs. 381-390 (Clayton Act of 1914). Mississippi: Miss. Const. (1890) sec. 198; Miss. Code Ann. (1942) secs. 1088-1108. Texas: Tex. Const. Art 1, sec. 26; Tex. Stat. (Vernon, 1925) Art. 7426-7428. These state statutes are typical.
23. U. S. v. Socony-Vacuum Oil Co., Inc., 310 U. S. 150, 60 Sup. Ct. 811, 84 L. Ed. 1129 (1940); U. S. v. Trenton Potteries Co., 273 U. S. 392, 47 Sup. Ct. 377, 71 L. Ed. 700 (1927); U. S. v. American Linseed Oil Co., 262 U. S. 371, 43 Sup. Ct. 607, 67 L. Ed. 1035 (1923).
24. American Column & Lumber Co. v. U. S., 257 U. S. 377, 42 Sup. Ct. 114, 66 L. Ed. 284 (1921).
25. Danciger Oil & Refining Co. v. Railroad Commission, 49 S. W. 2d 837 (Tex. Civ. App. 1932), rev'd., 122 Tex. 243, 56 S. W. 2d 1075 (1933).
26. Champlin Refining Co. v. Corporation Commission of Oklahoma, 286 U. S. 210, 52 Sup. Ct. 559, 76 L. Ed. 1062 (1932); Ohio Oil Co. v. Indiana, 177 U. S. 190, 20 Sup. Ct. 576, 44 L. Ed. 729 (1900).
27. 317 U. S. 341 (1942).
28. Miss. Code Ann. (1942) sec. 6172.
29. Okla. Stat. Ann. Title 52, sec. 286.17.
30. Acts of Ark. 1939, Act 105, sec. 15c.
31. Art. 6008, sec. 21, R. C. S. (1925).
32. Campbell v. Pettigrew, 268 S. W. 615 (Ark. 1925); Tidal Oil Co. v. Fullerton-Stuart Lumber Co., 137 Okla. 58, 278 Pac. 330 (1929); Ash v. Mickleson, 118 Okla. 163, 247 Pac. 680 (1926); Wagner Supply Co. v. Bateman, 118 Tex. 498, 18 S. W. 2d 1052 (1929); Leath v. Benton Abstract & Title Co., 9 S. W. 2d 501 (Tex. Civ. App. 1928).

The following authorities are to the same effect: Cogdall v. Cottrell, 82 Okla. 125, 198 Pac. 581 (1921); Cox v. Bond, 91 S. W. 2d 479 (Tex. Civ. App. 1936) (wherein recent leading authorities on the subject are discussed); Ebberts v. McLean, 68 S. W. 2d 1077 (Tex. Civ. App. 1934); Champion v. D'Yarmett, 293 S. W. 587 (Tex. Civ. App. 1927); Bolding v. Camp, 296 S. W. 1116 (Tex. Civ. App. 1927), rev'd. 6 S. W. 2d 94, modified, 7 S. W. 2d 867 (Commission of Appeals, 1928); Indiahoma Rfg. Co. v. Wood, 255 S. W. 212 (Tex. Civ. App. 1923); 2 Thornton, Oil and Gas (5th ed. Willis 1932-3) sec. 662; see also American Digest System, Mines & Minerals, Key No. 1, and cases there cited.

In accord are the following tax cases: Commissioner of Internal Revenue v. Rector and Davidson, 111 F. 2d 332 (C. C. A. 5th 1940), cert. denied, 311 U. S. 672 (1940); Commissioner of Internal Revenue v. Horseshoe Lease Syndicate, 110 F. 2d 748 (C. C. A. 5th 1940), cert. denied, 311 U. S. 666 (1940); Burnet v. Burns, 63 F. 2d 313 (C. C. A. 8th 1933) (co-owner not taxable as member of an association because his one-fourth interest is developed and operated by trustee as common agent); Reynolds v. McMurray, 60 F. 2d 843 (C. C. A. 10th 1932).

33. 111 F. 2d 332, 333 (C.C.A. 5th 1940), cert. denied, 311 U. S. 672 (1940).
34. U. S. Const. Art. IV, sec. 3 (2).
35. 30 U.S.C.A. sec. 181 et seq.
36. 4 SUMMERS, The Law of Oil and Gas (Perm. ed. 1938) sec. 867.
37. 5 id. sec. 971 et seq.
38. See 30 U.S.C.A. sec. 226 (e).
39. See Federal Register, Jan. 25, 1947, p. 528.

BOOKS

JET PROPULSION IN COMMERCIAL AIR TRANSPORTATION. By Robert E. Hage. Published by Princeton University Press, Princeton, N. J. 91 pp. $1.50.

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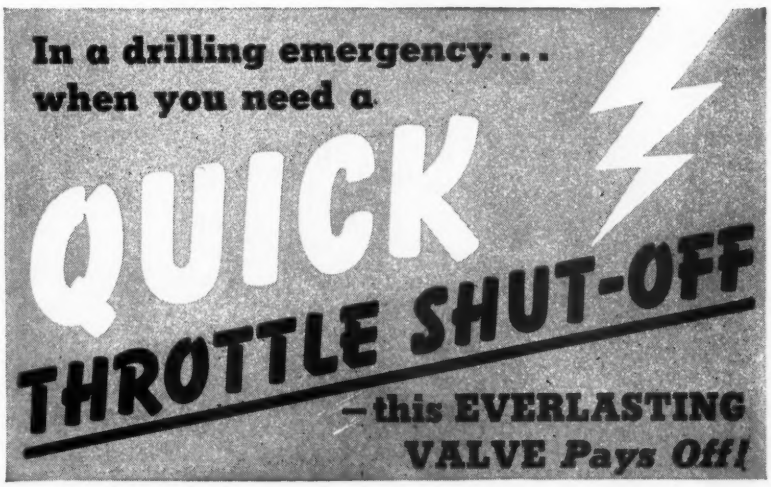

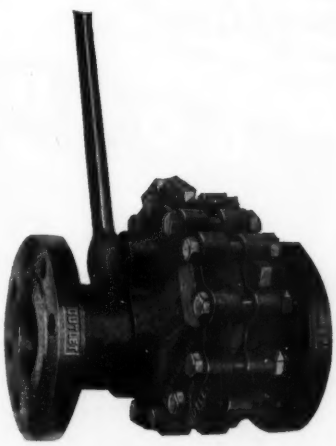

FLANGED Fig. 1001-350
SCREWED Fig. 1000-350

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Carter's Research Program

(Continued from page 212)

graph occupies one box, and the geophones another which makes a total of four boxes for the recording equipment. The seismic equipment is 24 trace, and all of it has been dipped in wax for waterproofing. Several types of portable drilling and shooting equipment have also been designed. Crews are also provided with refraction equipment and well-shooting equipment to determine velocities.

A portable mud logger has been designed to detect gas shows on a rotary drilling well as the gas is carried to the surface by the mud stream during drilling operations. It is placed on the rig floor or nearby and informs the driller or geologist of gas shows. In operation, a small portion of the mud stream is diverted and run through a gas trap in the logger. As the stream flows over baffles, gas bubbles in the mud are liberated and rise to the top of the trap. A vacuum pump maintains a slight vacuum in the trap thus drawing the gas over a detector. Detection is accomplished by forcing the gas through a combustion unit where it is ignited by a hot filament which is one arm of an electrical bridge circuit. The heat generated by this combustion changes the resistance of the filament and unbalances the bridge. The unbalance of the bridge circuit is indicated by a milliammeter and a relay-operated bell.

References

"Oil Pool Analyzer," W. A. Bruce, The Oil and Gas Journal, May 11, 1946, p. 90-92.

"The Restored-State Method for Determination of Oil in Place and Connate Water," W. A. Bruce and H. J. Welge, The Oil and Gas Journal, July 26, 1947, p. 41.

"Displacement of Oil From Porous Media by Water or Gas," H. J. Welge, presented at Tulsa meeting, A.I.M.E., October 8-10, 1947.

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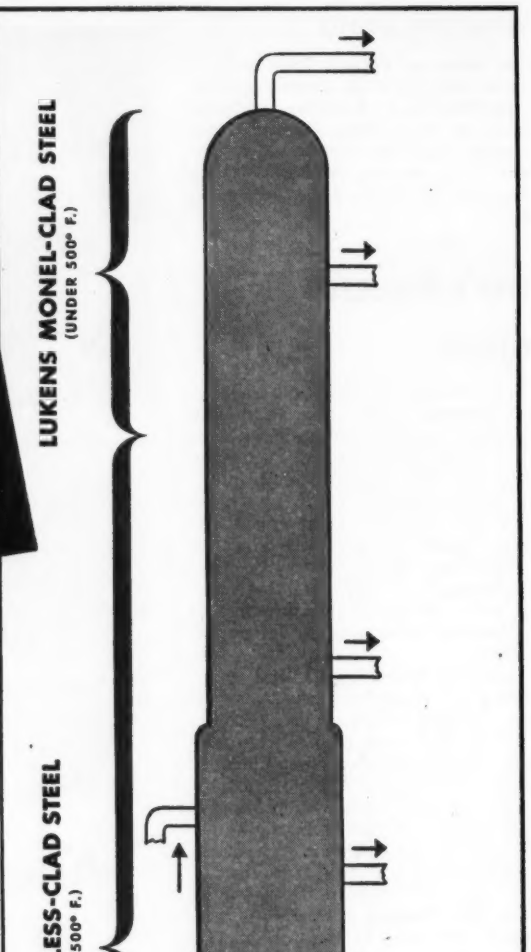

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PROGRESS IN METALS

by W. L. Nelson

Consulting Engineer

Corrosion Resistance of Cast Irons

THE resistance of gray cast iron and austenitic cast iron to several petroleum services is indicated in Table 1. These services along with about 440 more are listed by F. L. LaQue in "Cast Iron in the Chemical and Process Industries," which is distributed by Gray Iron Founder's Society, Inc., Washington. The primary position and importance of cast iron in the field of chemical processing are based on its inherent cheapness. Thus, it continues to be important even though many new corrosion-resistant alloys have been developed.

TABLE 1—RESISTANCE OF CAST IRONS TO SOME PETROLEUM SERVICES

Corrosive medium—	Location of test specimens	Duration of test	Temp. (°F.)	Aeration	Velocity	Average corr. rates (in. per year) Cast iron	Aust. C.I.
Chrolinated solvents, condensate and steam	Condenser	99 days	140-200	.....	.....	0.09	0.01
Gasoline, vapor of straightrun (63° A.P.I.)	Lower section above No. 16 tray of stabilizer	6,252 hours	375	.....	95 psi. pressure	0.006	0.002
Gasoline, straightrun (63° A.P.I.)	5 ft. above bottom of reflux accumulator	6,252 hours	110	.....	60 psi. pressure	0.003	0.002
Gasoline, straightrun, with some HCl and H_2S	Top trap of bubble tower in topping unit	116 days	250-260	None	Rapid due to bubbling	0.05	0.01
Gasoline, cracked with some HCl and H_2S	Top tray of bubble tower in Donnelly cracking unit	116 days	400-415	None	Rapid due to bubbling	0.002	0.001
Gasoline, aviation*	Base of column below packing in Stedman fractionating column	13 days	225 95 e.p.	Slight	Vapor stream 25 ft. per sec.	0.002	0.0006
Gasoline: distilled tops from straightrun with 0.025-0.05 g/l H_2S†	Separator tank of reflux pump	23 days	240-260	None	By liquid flow	0.23	0.024
Hydrogen sulfide, moist	Laboratory	7 days	200	.....	.....	0.07	0.01
Hydrogen sulfide, 98%; balance air and N_2	Gas path of extraction unit	188 days	90	Good	By gas flow	0.003	0.002
Naphtha, plus 15-30% of a mixture of oleic, linoleic and abietic acids	At bottom of scrubber	196 days	Room to 570	None	None	0.002	0.0002
Naphtha: rerun acid treated with mercaptans	Look box	33 days	Room	None	By flow	0.18	0.03
Naphtha: rerun acid treated with mercaptans	The still	11 days	400	None	By flow	0.74	0.19
Naphtha: rerun acid treated	Naphtha stream from battery	78 days	100-110	.....	.....	0.40	0.03
Naphthenic acids in distillate from South American petroleum (low velocity liquid phase)	Bottom primary fractionating column	174 days	500	None	Low liquid velocity	0.008	0.005
Naphthenic acids in heavy distillate from South American petroleum	Between trays 6 and 7 of second fractionating column	50 days	554	None	By flow	0.008	0.01
Oil, sour lube (2% sulfuric acid, 58% hydrocarbons, 40% water)	Agitator	365 hours	100	None	None	0.16	0.02
Oil, condensate of light gas, non-condensable gases and steam	Condensate line	1,176 hours	90-120	.....	.....	0.03	0.007
Petroleum: crude oil and H_2SO_4	Crude-oil agitator	90 months	Atm.	.....	Some	0.04	0.003
Petroleum: crude-oil vapors	Vapor section of bubble tower	2 months	250	.....	.....	0.18	0.05
Petroleum: Ranger low S crude	Above highest baffle below lowest of 10 bubble trays	1,701 hours	640	.....	170 psi. pressure	0.02	0.01
Petroleum: oil with hydrochloric acid and hydrogen sulfide vapors	In vapors at top of crude-oil bubble tower	7 days	235	None	Some	1.15	0.4
Petroleum: lubricating-oil vapor with hydrochloric and organic acids	In vapor line of still	10 days	700	.....	.....	0.51	0.13
Petroleum: lubricating oil with hydrochloric and organic acids	In still	10 days	700	.....	.....	0.67	0.13
Petroleum: vapors from fractionation of Illinois crude	In vapor section of fractionating tower	564 hours	715	None	Slight	0.05	0.04
Sodium hypochlorite, 0.1%	Laboratory	30 hours	140	.....	None	0.37	0.21
Steam	In a nipple expanded from high-pressure steam line	31 days	350	Good	120 psi. pressure	0.002	0.0007
Steam condensate with dissolved O_2 and CO_2	In condensate return line	30 days	180	Good	By flow	0.002	0.00004
Steam condensate and cooling water‡	In nipples expanded from steam lines	30 days	60-200	Good	By flow	0.04	0.02
Sulfuric acid, 60° Be.	Laboratory	4 hours	203-212	None	None	.....	0.62
	Laboratory	10 hours	203-212	None	None	.....	0.56
Sulfuric acid, 72% polymer gasoline, butane, and butylenes	In gasoline tower	237 days	175	.....	Due to bubble caps	0.07	0.02
Water, fresh, pH 8.5 (185 p.p.m. $CaCO_3$)	In discharge from cooling tower	23 days	85	80% sat.	Some	0.03	0.02
Water, salt, from oil wells	In salt-water pit	217 days	60	Slight	By flow	0.02	0.001

*Dry during major portion of distillation cycle, but steam present from 180°-212° F. Specimens in columns during three steam-out periods totaling 30 hours; max. temp. 350° F. Remainder of time samples exposed to air at 100° F. average temperature. †Max. pitting, mils per test period; C.I. 10; Aust. C.I. 5. ‡Max. pitting, mils per test period; Aust. C.I. 11.

careful preparation

IS NECESSARY IN BENDING ALLOY PIPING, also

Like a good garden, alloy pipe bending requires careful, painstaking preparation. For example, the sand with which alloy pipe is packed must be carefully selected to avoid contamination or pitting of the pipe metal.

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Pouring Temperatures for Liquids

AUTHORITATIVE commitments about suitable temperatures for handling or exposing liquids to the air are not available because of the many different situations that arise.

Danger of fire is an important consideration but only the so-called heavy oils (kerosine and heavier) have flash points high enough to permit handling of them at room temperature. Thus, **safe** pouring temperatures are not even listed on the tabulation on this page. Most generally, safe pouring temperatures are about 30° F. below the flash point of the material and even lower temperatures are advisable if ventilation is poor.

The pouring temperatures suggested here are based on the temperature at which the material will exert a vapor pressure of 300-400 mm. Such a vapor pressure is indicated by the Pouring Temperatures given in A.P.I. Code No. 50-B (Measuring, Sampling, and Testing Natural Gasoline) and by the temperatures employed in the Reid vapor pressure and A.S.T.M. distillation tests of gasoline and natural gasoline. Much lower temperatures than those listed here are suggested in A.P.I. Code No. 25 (Measuring, Sampling, and Testing Crude Oil) for the hydrometer gravity test. It recommends a test temperature of 65° F. for crude oils that have a gravity less than 70° A.P.I. and an initial boiling point under 250° F., and a temperature of 35° F. for oils whose gravity exceeds 70° A.P.I. Nevertheless, it allows higher temperatures if the crude oil is viscous.

The 300-400 mm. allowed here is based primarily on whether or not the composition of the sample will be greatly altered by exposure at the pouring temperature. Such a vapor pressure at the pouring temperature indicates that the amount of oil vapor lost will be about equal to the amount of air that comes into contact with the oil—that the mixture of vapor that is produced will consist of about half air and half oil vapor.

Thus, if the aeration or ventilation is vigorous, lower pouring temperatures than those shown here should be used, and of course, it is always advisable to employ as low a pouring temperature as possible. The term "wide boiling" as used here refers to materials that contain small amounts of relatively low-boiling material such as a natural gasoline that contains propane, a gassy or unexposed crude oil, unstripped refinery products, or fuel oils or asphalts that have been cut back with lighter materials. Even small losses from such materials greatly alter the flash point, gravity, composition, etc., of such materials. It must be recognized that each situation must be judged independently.

APPROXIMATE RELATION OF VAPOR PRESSURE, FLASH POINT, BOILING POINT AND POURING TEMPERATURE

Reid v.p. (psia.)	Flash point (°F.)	Approx. 0-10% boiling range (°F.)	Illustrative materials		Pouring temp., (°F.)	
			Fractionated	Wide boiling	Fractionated	Wide boiling
45	...	...	Nat. gasoline	Wild nat. gas	12	—11
40	...	...	Nat. gasoline	Wild nat. gas	20	—5
35	...	...	Nat. gasoline	Wild nat. gas	28	2
30	...	...	Nat. gasoline	Wild nat. gas	38	9
25	...	...	Nat. gasoline	Wild nat. gas	48	18
20	...	80	C_3 free N. gaso.	Contains C_3	60	26
15	...	95	C_3 free N. gaso.	Contains C_3	77	36
10	...	115	C_3 free N. gaso.	Contains C_3	100	48
8	...	125	Stable gaso.	Crude oil	112	57
6	...	140	Stable gaso.	Crude oil	123	67
4	...	160	Stable gaso.	Crude oil	140	86
2	...	190	Solvents	Unstripped	178	125
...	30	215	Solvents	Unstripped	195	135
...	50	245	Solvents	Unstripped	225	165
...	70	275	Solvents	Unstripped	245	185
...	90	305	Solvents	Unstripped	270	210
...	110	335	Kerosine	Unstripped	305	240
...	150	395	Distillates	Gas oil	365	280
...	200	475	Distillates	Fuel oil	440	330
...	250	550	Gas oil	Cutbacks	515	380
...	300	625	Fuel oil	Asphalts	585	430
...	350	700	Lube oil	Asphalts	*660	490
...	400	780	Lube oil	Asphalts	*660	540
...	500	930	Lube oil	Asphalts	*660	640
...	...	1,000	Asphalts	Asphalts	*660	*660

*Decomposition occurs at higher temperatures.

No. 197 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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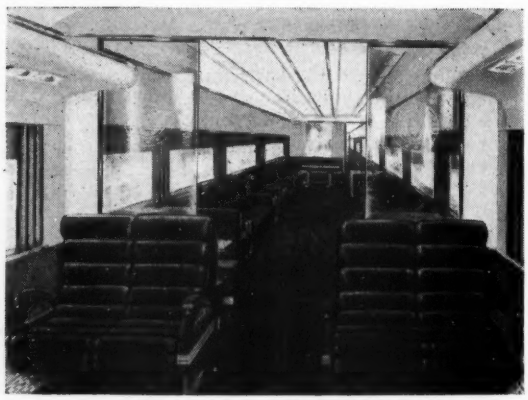

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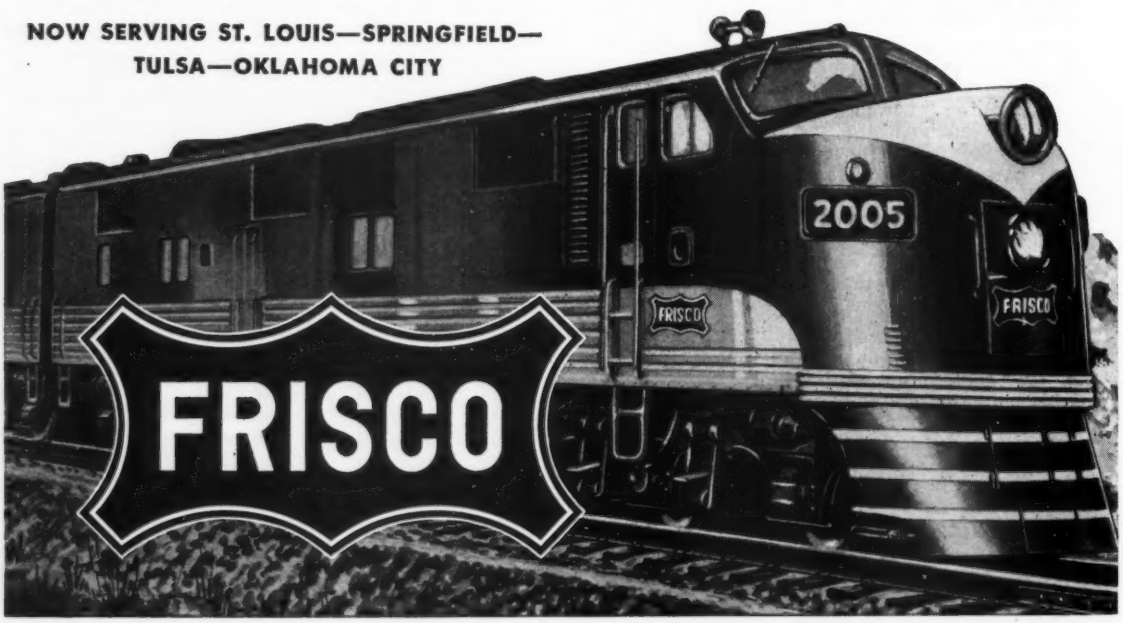

ENGINEERING *fundamentals*

Correlation of Connate Water With Permeability

THE determination of connate water by capillary-pressure measurement (sometimes called the restored-state method) has allowed the evaluation of connate-water values on samples of varying permeability and within a given reservoir to a wider extent and to a greater accuracy than was beforehand possible. These measurements have accumulated to the point where it is possible to correlate connate-water content with the permeability of the sample in a given reservoir and to a certain extent between reservoirs.

In an ideal pore configuration of uniform structure the irreducible connate water would be independent of permeability, lower permeabilities being obtained merely by a scaled reduction in particle size. In an actual porous system formed by deposition of graded particles or by some other natural means, the connate water might be expected to increase as permeability decreases. This conclusion results from the thought that lower permeabilities result from increases nonuniformity of pore structure by a gradation of particles rather than by a scaled reduction of particles. In this sense connate-water content is a function of permeability only insofar as permeability is dependent upon the variation of pore structure. Thus for unconsolidated sands formed of uniform particles of one size the connate-water content would be independent of permeability.

Any correlation found between these variables would be anticipated to apply only within the rather narrow limits of a single reservoir or perhaps to a given formation. Beyond these bounds a general correspondence between permeability and pore structure would not be known. It would be anticipated, however, that for formations of similar characteristics a similar dependence of permeability on pore structure and consequently similar correlation of connate water and permeability would be found.

It has been generally considered for many years that connate water reached higher values in lower permeabilities. This observation amounted to nothing more than a trend. The data from capillary pressure measurements have indicated that the relationship is semilogarithmic, although it is not yet certain from published data that this is the exact relationship. Some authors describing this type of measurement prefer to give a curvature to the semilogarithmic plot. Three references were used to bring together published correlations (references appended). Actually, such published data represent a small percentage of the measurements that have been made by the industry, but they suffice to demonstrate the possibilities.

The connate-water versus permeability trends have been plotted as straight lines in Fig. 1. Twelve separate formations are represented. No generalizations are apparent from this amount of data although it can now be quite generally stated that within a given reservoir the connate water (if an irreducible value) will increase proportionally to the decrease in the logarithm of the permeability. It is apparent, moreover, that one cannot state the value of connate water expected in any new formation unless one knows something of its pore makeup.

It should be noted that the permeabilities referred to in Fig. 1 are air permeabilities. In Reference 3 one group of data was given with water permeability. These had no correlation. This results from the consideration that air permeability gives a measure of pore configuration alone whereas water permeability may combine pore structure and surface effects.

It could be noted that the correlation lines of Fig. 1 possess similarity of slope. Numerical values of the slopes are as follows:

Formation	Slope	Formation	Slope
1	28.2	7	11.4
2	53.0	8	8.4
3	13.0	9	11.5
4	13.0	10	18.4
5	9.0	11	18.3
6	10.3	12	17.6
		13	15.0

With the exception of 1 and 2, these give an average value of 13.3, or in other words the average connate-water increase is 5.2 per cent each time the permeability is cut in half.

References

1. The Restored State Method for Determination of Oil in Place and Connate Water; Bruce and Welge; A.P.I. Division of Production; Mid-Continent Section spring meeting, 1947; The Oil and Gas Journal, July 26, 1947, p. 223.

2. Estimating Interstitial Water by the Capillary Pressure Method; Thornton and Marshall, A.I.M.E. Transactions, 1947 (170); (Abs.) The Oil and Gas Journal, October 5, 1946, p. 97.

3. Determination of the Interstitial Water Content of Oil and Gas Sand by Laboratory Tests of Core Samples; McCullough, Albaugh, and Jones; A.P.I. Drilling and Production Practice, 1944.

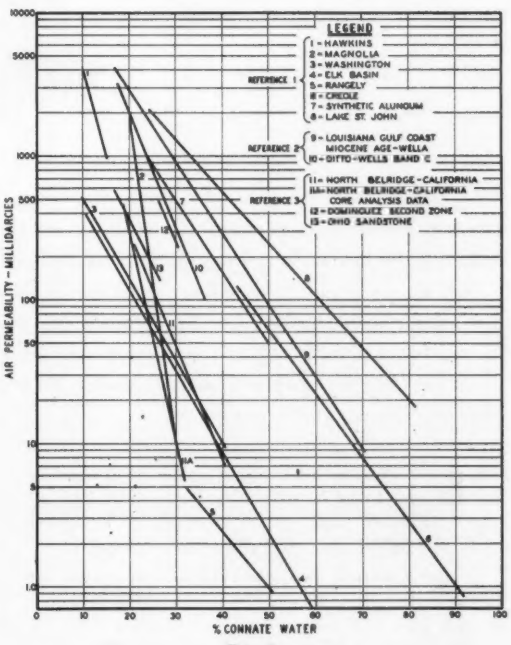
LEGEND
1 - HAWKINS
2 - MAGNOLIA
3 - WASHINGTON
4 - ELK BASIN
5 - RANGELY
6 - CREOLE
7 - SYNTHETIC ALUMOUM
8 - LAKE ST. JOHN
REFERENCE 1
REFERENCE 2
9 - LOUISIANA GULF COAST MIOCENE AGE - WELLA
10 - OITTO - WELLS BAND C
REFERENCE 3
11 - NORTH BELRIDGE - CALIFORNIA
11A - NORTH BELRIDGE - CALIFORNIA CORE ANALYSIS DATA
12 - DOMINGUEZ SECOND ZONE
13 - OHIO SANDSTONE
AIR PERMEABILITY - MILLIDARCIES
% CONNATE WATER

Fig. 1

Series prepared by Dr. John C. Calhoun, Jr., Petroleum Engineering School, University of Oklahoma

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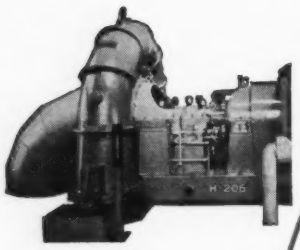

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Centrifugal Pumps	Pacific
Rotary Positive Blowers	Roots-Connersville
Reciprocating Gas Compressors	Clark
Storage Tanks	Stacey Bros.
Engines—Gas or Oil	Clark
Exhausters	Roots-Connersville
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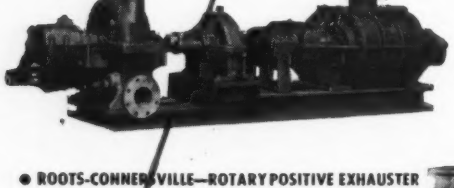
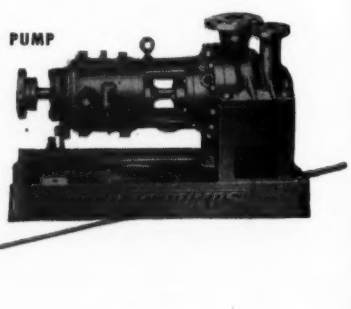


● ROOTS-CONNERSVILLE—ROTARY POSITIVE EXHAUSTER

● PACIFIC—CENTRIFUGAL PUMP



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PIPE LINES

West Texas Outlet To Operate in June

HOUSTON. — The Midland-Wichita Falls section of the new West Texas pipe line which will be held by four companies on an undivided interest basis is expected to go into operation late in June.

The entire project connects Jal, N. M., and Cushing, Okla., and provides a much-needed outlet for West Texas crude oil, at present the only major producing area in the nation not producing at capacity.

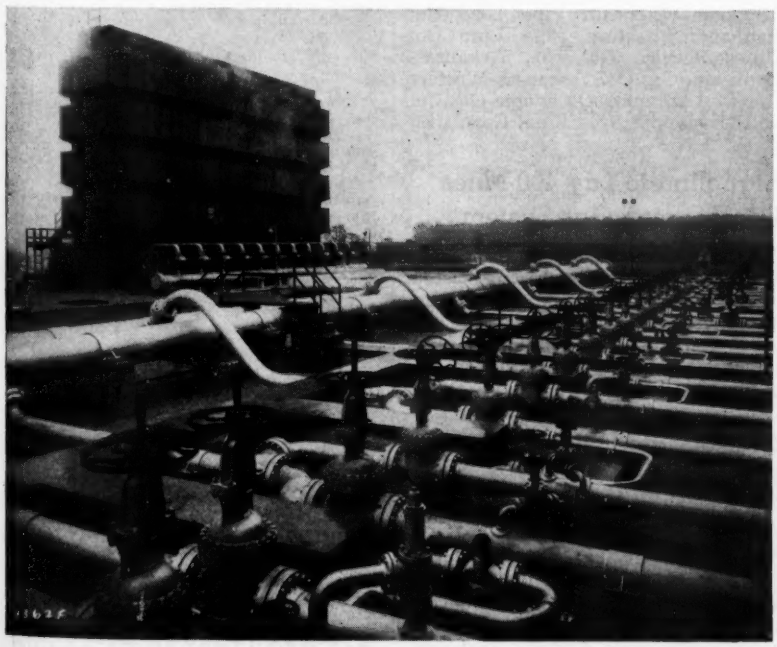
The 20-in. Jal-Midland section of the line already is completed. The 22-in. 253-mile section from Midland to Wichita Falls is expected to move some 70,000 bbl. daily at first, with an increase to 105,000 bbl. daily due by the end of October. The 24-in. section from Wichita Falls to Cushing is scheduled for completion early next year.

The line is being built by The Texas Pipe Line Co. Other participating companies are Shell Pipe Line Corp., Sinclair Refining Co., and Empire Pipe Line Co. Crude will be taken at Wichita Falls through existing company lines pending completion of the section to Cushing and other lines from Cushing to refineries in the Middle West.

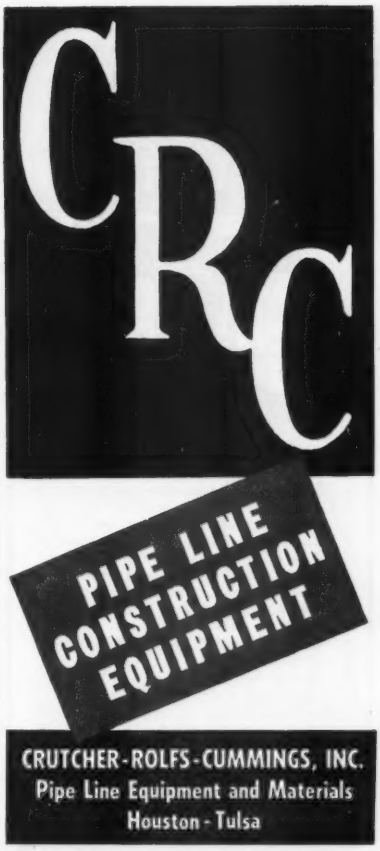
Last week R. B. McLaughlin, Texas Pipe Line Co. president, announced a contract has been let to Brown Lane Co., Amarillo, construction contractors, to build and install a modern pump station at Midland as a part of the line's pumping facilities. The station will have electric motor-driven centrifugal pumps and other new features. Work is to start in the near future. The station will be located 2 miles east of Midland.

Loading Rack Being Built at Wichita Falls

A 400-car loading rack is being constructed at a location along the tracks of the Missouri-Kansas-Texas Railroad in the Wichita Falls, Tex., area. The rack is to be completed in July for the purpose of handling shipments of crude oil which are due to arrive from Jal, N. M., and West Texas connections of a trunk line, now under construction by four pipeline companies, which will ultimately terminate at Cushing, Okla. This loading rack is intended only for temporary service until scheduled pipe-



Manifold piping and cooling tower at Panhandle Eastern Pipe Line Co.'s Zionsville, Ind., compressor station on the company's transmission line from the Texas Panhandle to Michigan



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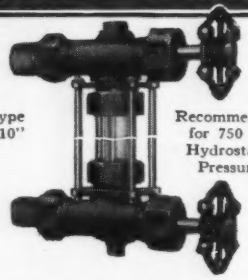

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PIPE LINE SURVEYS

line facilities are completed northeastward.

Trans-Continental Line To Cost $151,380,426

Trans-Continental Gas Pipe Co., Inc., told the Federal Power Commission in a hearing last week that a revised estimate places the construction cost of the company's proposed 1,400-mile pipe line from Texas to the Eastern Seaboard at $151,380,426.

The estimate was $5,046,709 below a previous figure presented to the commission.

FPC Sets Trunkline Gas Hearing June 28

Hearing on the application by Trunkline Gas Supply Co., Wilmington, Del., for authority to construct and operate a natural-gas pipe-line system beginning in Wharton County, Texas, and extending north through Arkansas and Missouri to Keokuk County, Iowa, has been set for June 28 by the Federal Power Commission.

The proposed facilities include a 30-in., 855-mile gas-transmission pipe line and facilities for gathering, dehydration, compression, transmission, and delivery of natural gas through the proposed system, including 60 miles of 24-in, feeder lines and 12 compressor stations with a total of 182,400 hp. Over-all cost, including working capital, has been estimated at $74,266,507.

Prospective customer companies include Natural Gas Pipeline Co. of America, Northern Natural Gas Co., Michigan-Wisconsin Pipe Line Co., Panhandle Eastern Pipe Line Co., Cities Service Gas Co., Arkansas-Louisiana Gas Co., Arkansas-Western Gas Co., Arkansas-Oklahoma Gas Co., and Mississippi River Fuel Corp.

Stanolind to Lay 400 Miles For Hugoton Gas System

Stanolind Oil & Gas Co. is making plans for laying a gathering system of 400 miles for transmitting natural gas from wells located in a 200,000-acre area to the synthetics plant which the company will build in Hugoton field, Kansas.

Consolidated Hearing Is Set for June 1

A hearing consolidating applications filed by Tennessee Gas Transmission Co., Commonwealth Natural Gas Corp., Atlantic Seaboard Corp., and Virginia Gas Transmission Corp., has been set for June 1. The hearing was consolidated since Atlantic Seaboard, Virginia Gas Transmission, and Commonwealth are expecting their gas

It's EASY to Protect PIPE JOINTS with TAPECOAT

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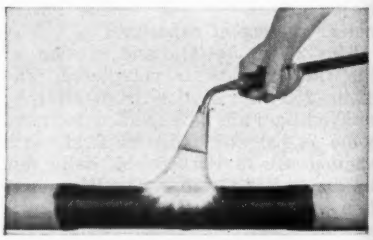
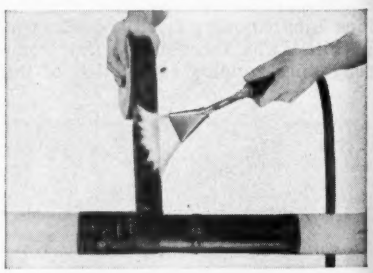
Just follow three simple steps

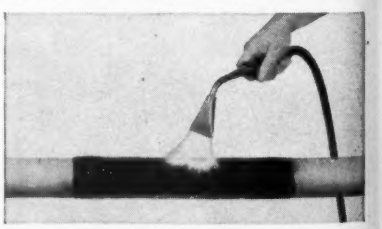
A practical, protective coating in handy tape form, TAPECOAT is easy to apply on pipe joints to give protection equivalent to the mill or machine coating on the pipe. It's clean—no dirt, no mess. Saves time and labor. Economical. Here's all you do:



STEP 1—Remove kraft paper on mill or machine coating back far enough to start one spiral wrapping of TAPECOAT over mill coating. Clean and dry bare pipe with torch as shown.



STEP 2—Start wrapping TAPECOAT where kraft paper has been removed. Flash flame of torch *lightly* on TAPECOAT to bleed its coating. Secure double thickness of TAPECOAT by overlapping slightly more than half the width of the tape.



STEP 3—Finish wrapping TAPECOAT. When wrapping is completed, flash the torch flame over entire TAPECOATED section to bleed coating to a shiny surface.

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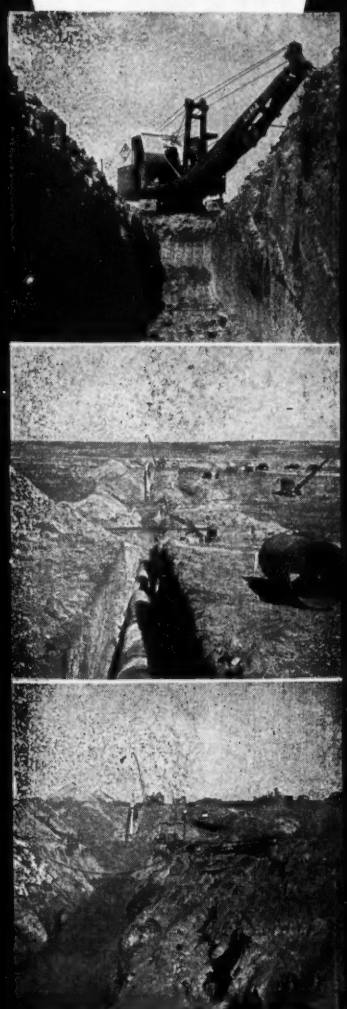

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requirements either directly or indirectly from Tennessee Gas Transmission.

Proposed facilities of Tennessee Gas to cost approximately $124,354,000, include 992 miles of loops along the existing main pipe line, approximately 395 miles of 26-in. main line from northeastern Kentucky to near Buffalo, N. Y., additional compressor units with 91,200 hp., and other equipment to bring the company's natural-gas pipe-line system capacity to 1,000,000,000 cu. ft. daily.

Commonwealth Natural, which presently does not operate any natural-gas transmission facilities, proposes construction of a 537-mile line from the Tennessee Gas trunk line at West Bend, Ky., to Norfolk, Va. Laterals would be constructed to Roanoke, Petersburg, Richmond, and Suffolk, Va.

Atlantic Seaboard and Virginia Gas propose construction and operation of 268 miles of 26-in. line from Clendenin, W. Va., to Rockville, Md. Cost of the line and appurtenant facilities has been estimated at $20,649,600.

Atlantic Ships Two Pump Units to Venezuela

Venezuelan Atlantic Refining Co., an affiliate of Atlantic Refining Co., has procured two 20,000-bbl. pumping units which have been shipped to Eastern Venezuela for pipe-line service. Each of these units has a Byron Jackson centrifugal pump driven by a 12-cylinder Le Roi engine (7½-in. bore, 7-in. stroke) built for continuous operation at speeds up to 1,200 r.p.m. Assembly and fabrication of these skid-mounted units has been done by John M. McGregor, Tulsa.

Atlantic interests have been developing crude-oil production in the Tucupido area of Guarico in a locality which is approximately 15 miles from the 157-mile, 16-in. pipe line now being built by S.A. Petrolera La Mercedes. Atlantic also has oil production in the Pelayo concession in the State of Anzoategui, Eastern Venezuela.

Permit to Build Imperial Valley Gas Line Sought

Southern California Gas Co. has requested authority from the Federal Power Commission to construct a natural-gas line connecting with the Texas-California line of El Paso Natural Gas Co. at a point near Desert Center, Calif., and extending into the Imperial Valley of Southern California. Cost has been estimated at $1,150,000.

Of the 83-mile Imperial Valley line, 20 miles of used and reconditioned pipe would be used. The line, from 4 to 16-in. in diameter, would be completed by November 1, according to company officials.

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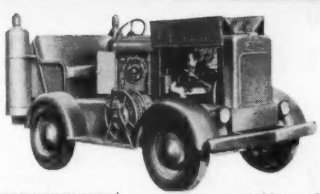

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2 Meter design permits conversion of the basic assembly to practically all flow applications by simply changing the ring.

3 The calibration of the meter is independent of the net density of the sealing liquid. No correction is needed for water on mercury, etc.

4 Calibration is independent of the quantity of sealing liquid, so long as a seal is maintained.

5 Calibration is not affected by changes in density of the sealing liquid due to changes in ambient temperature.

6 There is no mechanism in contact with the fluid under measurement.

7 Meter may be checked or recalibrated by the dead weight method, employing test weights supplied, or by a water column. The weight method permits convenient testing under existing pressure conditions.

8 High accuracy in the conversion of differential head to pen movement at low flows is assured by the unique spring resistance system.

9 Excellent torque-to-friction ratio results in high sensitivity.

10 No stuffing boxes are used in Ring Balance Meters.

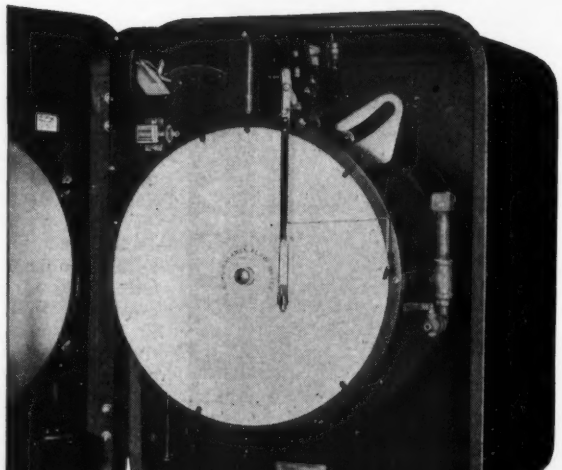
11 The non-corrosive knife edges and ways supporting the ring assembly are inverted to eliminate accumulation of dirt.

12 Over-range operation troubles encountered in ordinary meters are eliminated.

13 The meter assembly is completely housed in a dust-tight case.

14 Skid rails permit the assembly to be shifted forward and backward in the case for inspection of all parts without disconnecting any part. Also, the entire assembly may be removed conveniently from the case.

15 The integrator is a simple accurate unit, easily checked. The readings are totalized on a counter which can be read without opening the case.



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Drilling Contractors

Pacific Drilling Co. has received two recent contracts. First is a wildcat for Elkhorn Oil & Development Co., the 1 Morris Estate, Elkhorn Valley area, San Luis Obispo County, California. Other test is for Cadillac Oil Co. in Huntington Beach field.

Russell Shaw, Lloydminster, Alta., has contract for two wells to be drilled in Blackfoot area of Lloydminster field for Northwest Oil Syndicate of Vancouver, headed by C. L. Gladman and J. H. Hutton. Northwest 1 has location in NW 7, 11-50-2w4, offsetting producers to the south and east.

Scott Brothers, Chino, Calif., are drilling a wildcat for Charles F. Holmes near Oceanside, San Diego County, California.

Loffland Brothers, Tulsa, have been awarded contract to drill Pure Oil Co.'s first offshore venture in the Louisiana sector, in the Vermilion area of Vermilion Parish. The test, 1 State Lease 880, Block 39, is to be drilled to 12,000 ft.

Cactus Drilling Co., San Angelo, Tex., will drill George F. Getty 1 Mrs. Hallie Day, 3,200-ft. cable-tool wildcat in southeast Crane County. Texas. Location is 330 ft. from north and 990 ft. from east lines, Section 3, Block X, CCSD&RGNG Survey, and 2½ miles south of the town of Crane. It is on a farmout from Humble Oil & Refining Co. and The McElroy Ranch Co., which had been taken by Charles Poteet, of Crane, and turned to Getty, of Los Angeles, to drill.

Active rotary drilling rigs in the United States reached a new all-time high on May 1 with a total of 2,208. See story in News Developments section.

Anderson Carey Drilling Co. has moved its headquarters from Shawnee to 1120 Hales Building, Oklahoma City. Carl B. Anderson is president of the firm and Cecil V. Carey, vice president.

Clyde Gibson, Wichita Falls, has contract for Continental Oil Co. 1 Green, wildcat in Section 883, TE&L Survey, 2½ miles southwest of Oran, Palo Pinto County, Texas. Contract is for 5,500-ft. test.

Woods Drilling Co., New Orleans, has added another 1,000-bbl. well on its Jones lease, Northwest Iconium field, Logan County, Oklahoma.

This Rowan Drilling Co. (Fort Worth) crew is on a well for Union Oil Co. in Fullerton field, Andrews County, Texas. Shown are: Leon Black, Lawrence D. De Wees, D. C. Allen, and J. C. Kessenger, driller

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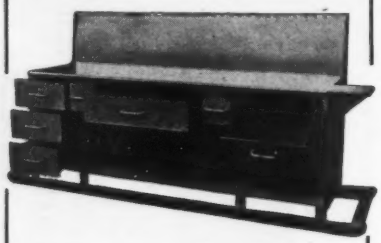

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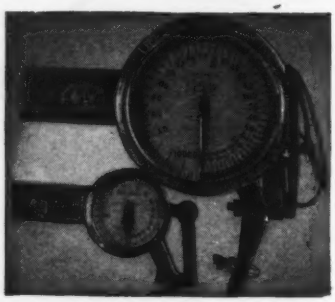

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Woods is also currently drilling two Jefferson County wildcats. One is a 7,000-ft. test in 28-4s-4w, and the other a 5,000-ft. Arbuckle test in 33-6s-4w.

Big Chief Drilling Co., Oklahoma City, has started Cities Service Oil Co. 1 Ayers, in northwest corner of Roseland Plantation, 82-7n-2w, La-Grange area, Mississippi.

J. F. Justiss has received contract for Victor P. Grace et al 1 W. D. Ambrose, SE 10-5n-6w, on Gorum prospect, southern Natchitoches Parish, northern Louisiana. Contract is for 7,000 ft. or Wilcox.

Retsal Drilling Co., Shreveport, has contract for 6,000-ft. test for D. Thomason and Smith & Turner, their 1 Giagues, wildcat in C NE SE 27-7n-14w, 2 miles south of Blue Lake field, Sabine Parish, northern Louisiana.

B. G. Byars, Tyler, has started 5,400-ft. test for J. E. Davant and Maner Graham, their 1 Tideman, wildcat on 2.222-acre tract, George Robertson Survey A-38, 5 miles northeast of Calvert, Robertson County, East Texas.

B & M Drilling Co. is drilling R. J. Caraway 1 Morrison, test in M. A. Esparcia Survey, Hawkins field, Wood County, East Texas.

Parker Drilling Co., Tulsa, will drill 11,500-ft. test for Barnsdall Oil Co. et al in Franklin County, Mississippi. Wildcat is 4 miles north of Zion Hill.

Southeastern Drilling Co., Jackson, is starting Union Producing Co. 1 Bradshaw et al, C SW SE 19-3n-16w, north of Basterville field, Lamar County, Mississippi.

Dee Miller Drilling Co. has received permit to drill its 2 Besse Johnson, SW NW NW 7-4s-11e, White County, Illinois.

Grissel & Worth have contract for Sam Tait 1 Dorsey Mason, SE NW 21-24n-11e, Blackford County, Indiana.

Buffalo Drilling Co. will drill V. R. Gallagher 1 K. D. Owen, SW NE 11-5s-14w, Posey County, Indiana.

Calvert & Willis, Olney, Ill., have received contract for Sells Petroleum, Inc. 6-C Elliott and Hickman, SW NW NW 24-5s-14w, Posey County, Indiana.

Rine Drilling Co. and Drillers Gas Co. are below 2,000 ft. at their 1 Lorimor, rank wildcat in C SE NW 20-30-20, near southwest corner, Kiowa County, Kansas. Location is 9 miles west of the one-well Alford gas pool and 30 miles west of Turkey Creek pool, Barber County.

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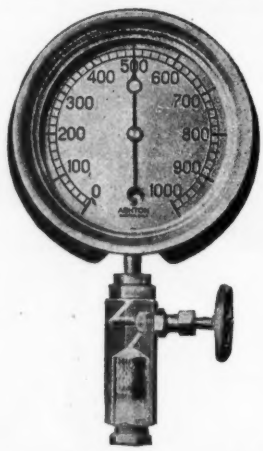

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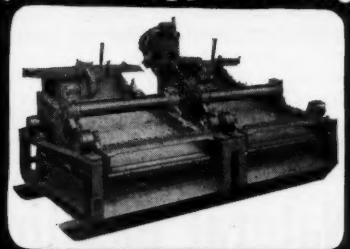

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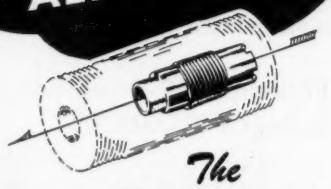

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Growth.—Ben L. Mouser and W. L. Ainsworth established Mouser Drilling Co. in 1941 and have operated primarily in central Kansas. The concern does a considerable portion of its drilling for its own interest. Mouser is the active supervisor of the

B. L. MOUSER

W. L. AINSWORTH

company's two rigs—a 4,500-ft. rotary rig and a cable-tool rig. John Cook is toolpusher for the concern. Mouser's back ground includes a stint as production superintendent, eastern Kansas division, Sinclair Prairie; work with Slick, Pryor, and Lockhart, and later with Transwestern Oil. Ainsworth is a geologist and is interested in Western Petroleum Exploration Co. with his brother Dave and also in Ainsworth Brothers, Inc., with brothers Dave and Alfred. Ainsworth Brothers, Inc., is a contract core-drilling company which has drilled over 5 million feet of core hole in the Mid-Continent area.

Sidelights.—Mouser Drilling opened an area between Silica and South Silica pools of Barton and Rice counties, Kansas, in 1946 with its Mouser 1 Burchart. Eleven straight producers were brought in following the Buchart on the company's 830 acres of leases in the area. Currently Mouser Drilling has a monthly production of its own of 10,000 bbl. Six of its properties are held in partnership with Western Petroleum Exploration Co.

Southern Six Drilling Co. will drill Atlantic Refining Co. 8 Haas Investment Co., 11-2s-2e, Dave Haas field, Avoyelles Parish, Louisiana. Contract depth is 8,750 ft.

Circle Drilling Co. will drill Continental Oil Co. 2 Louis F. Maraist, St. Martinville field, St. Martin Parish, Louisiana. Contract depth is 5,100 ft.

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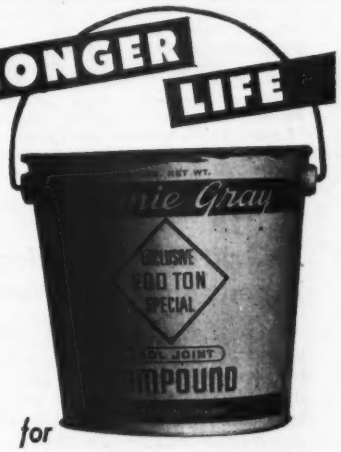

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NATURAL GAS

Two Phases of Study to Feature Gas Short Course

Two sections of study—one concerning the latest methods for solving important problems of production and transmission of natural gas, and the second the consideration of improved techniques in the utilization of natural gas—will feature the third annual short course in gas technology, sponsored by the Southern Gas Association, to be held at the Texas College of Arts and Industries, Kingsville, Tex. June 2-4.

Papers to be presented in the production and transmission section include: "Deviation: An Essential Factor in Balancing Volumes in High Pressure Production and Transmission of Natural Gas," E. N. Armstrong, superintendent of gas measurement department, Tennessee Gas Transmission Co., Houston; "Radio and Wireless Telephone Communications," Baity Bartel, Southwestern Bell Telephone Co., Dallas; "Automatic and Remote Control of Gas Pipe Line Flow," W. M. Moore, United Gas Pipe Line Co., Shreveport, La.

"The Design of Centrifugal Compressors for Natural Gas Transmission," by a representative of Ingersoll-Rand; "Centrifugal Compressors at the Seeligson Plant," Dan T. McDonald, Magnolia Petroleum Co., Dallas; "Latest Developments in Corrosion Prevention," Starr Thayer, Houston, and Robert Kuhn, consulting engineer, New Orleans; "Developments in the Construction of Large Diameter Pipe Lines," L. H. Favrot, Latex Construction Co., Houston; "Latest Developments in Types, Applications and Testing of Pipe Coatings," Stephen D. Day, Houston; "Trends in Natural Gas Cycling Operations," Dr. E. O. Bennett, consulting petroleum engineer, Houston.

A. G. A. Group Will Hear Reports on Gas Problems

Reports covering production and chemical process problems as well as the general outlook on the gas industry will highlight the program of the joint production and chemical committee conference of the technical section of the American Gas Association, to be held at the Hotel Berkeley-Carteret, Ashbury Park, N. J., May 24-26.

Among reports and speakers to be heard during the general session, parallel sessions, or luncheon conferences are: "The Outlook for Oil Supply," D. L. Barrett, fuel oil marketing division, Esso Standard Oil Co.; "Methods for Sampling and Analysis of L. P. Gases," E. O. Mattocks, Phillips Petroleum Co., Bartlesville, Okla.; "Prospective Benefits from Removing Excess Nitrogen from Natural Gas," P. V. Mullins, helium engineer, Bureau of Mines, Amarillo, Tex.; "Chemical Aspects of Underground Corrosion and Corrosion Prevention," Dr. I. A. Denison, chief, underground corrosion section, National Bureau of Standards, Washington; "Review of Reforming Higher Hydrocarbons," J. M. Carroll, assistant superintendent gas production, Philadelphia Electric Co., Chester, Pa.; "Catalytic Reforming of Hydrocarbons," Charles H. Riesz, Institute of Gas Technology, Chicago, Ill.; and "Operation of the Catalytic Plant at Riverhead," S. W. Horsfield, gas production manager, Long Island Lighting Co., Garden City, N. Y.

Topics for discussion included on the program are ethylene production, catalytic production of gas from gasoline, and joint L.P.G. and high b.t.u. gas.

Natural Gas Operating Revenues Up 18 Per Cent

Natural gas companies' operating revenues as reported to the Federal Power Commission amounted to $90,115,273 during February, an increase of 18.1 per cent over the same month a year ago.

Sales of natural gas to ultimate consumers in February totaled 148,141,000,000 cu. ft., an increase of 16 per cent over the corresponding period a year ago. Residential consumer sales were up 27.9 per cent; commercial and industrial consumer sales showed a gain of 29.3 per cent and 5.3 per cent respectively. Revenues from sales to ultimate consumers increased 21.2 per cent and amounted to $52,807,633.

For the 12-month period ending February 29, gas operating revenues aggregated $763,150,077, an increase of 15.8 per cent over the corresponding period ending February 28, 1947.

Carbon Black Reports Now Offered by OTS

Two reports—"Investigation into Manufacture and Use of Carbon Blacks and Lamp Blacks in Germany" and "Acetylene Carbon Blacks"—are being offered for sale by the Office of Technical Services, Department of Commerce.

The first report, prepared by British Intelligence objectives subcommittee investigators, is a general survey of carbon-black manufacture at six major German firms. It also includes a discussion of lamp-black manufacture. The manufacturing processes used by each of the plants visited are described in detail in the report, which includes several tables and flow sheets.

The second report, prepared by OTS investigator Fred S. Thornhill, gives the details of German manufacture of acetylene black.

Mimeographed copies of the reports (the first costing $3.25 and the second 50 cents) may be ordered from the Office of Technical Services, Department of Commerce, Washington 25, D. C.

Natural Gasoline

Cities Service Plans Pampa Plant Expansion

Contract for the modernization and redesigning of the Cities Service Oil Co.'s Pampa, Tex., natural-gasoline plant for ultimate processing of 18,000,000 cu. ft. of gas daily has been awarded Walco Engineering & Construction Co., Tulsa. Construction work is expected to begin some time this summer.

The program will include addition of approximately 2,600 hp. to compressor units, installation of absorbers to operate at 500 psi. pressure, new distillation equipment and cooling facilities, new fractionators and treating facilities, a boiler plant, water-treating plant, gas treaters, gas dehydrators, and additional high-pressure storage for liquid hydrocarbons.

The plant will be one of two that will treat and dehydrate the gas supplied to the West Pampa Repressuring Association's secondary-recovery project in the area.

Phillips' 1948 Expansion Is Set at $22,000,000

Construction of a gasoline plant at Chocolate Bayou, Tex., estimated to cost $4,500,000, and the erection of the new Sherman gasoline plant in the Panhandle and its field pipe line system, to cost about $10,000,000, comprise the major portion of the 1948 expenditures of $22,000,000 proposed by Phillips Petroleum Co. to expand plant capacities and additional facilities.

Included in the project will be an additional $4,000,000 to connect about 260 gas wells to the gasoline plant.

Other construction includes a catalytic cracking unit at the Kansas City refinery, additional manufacturing facilities at the Sweeny, Tex., refinery and increased fractionization facilities, replacement of a still at the Borger, Tex., refinery and new water flood projects.

Total capital investments of the company for 1948 are expected to be $120,000,000.

REFINING

Vulcan Copper Will Erect New Socony Process Units

Socony-Vacuum Oil Co., Inc., has authorized Vulcan Copper & Supply Co., Cincinnati, Ohio, to design and construct units for the recently developed Thermofor Pyrolytic Cracking process of Socony-Vacuum.

Operation of the T.P.C. units will be under licenses from Socony, arranged through Vulcan Copper.

The process, which was recently developed by Socony in its laboratories in Paulsboro, N. J., and uses low-grade petroleum and residual oils, is essentially a high-temperature conversion accomplished without the use of a catalyst by contacting the oil charge with a moving bed of inert granules raised to high heat. This vaporizes the oil and induces rapid high-temperature reaction. The heat transfer granules pass continuously through contacting and heating stages. The resultant unsaturated gaseous hydrocarbons consist primarily of ethylene.

The process is suitable also, according to Socony-Vacuum, for manufacture of certain aromatic hydrocarbon compounds.

Ethylene, an important raw material used extensively in the manufacturing of synthetic rubber, various plastics, alcohol, detergents, and tetraethyl lead, has been obtained heretofore from petroleum as a byproduct present in such low concentration as to require expensive separation processes.

Process for Cracking Ethane Is Described

A process developed during the war by the Germans for the thermal cracking of ethane is described in a report currently being issued by the Office of Technical Services of the Department of Commerce.

The report (PB-86765, Thermal Cracking of Ethane) was prepared by Francis J. Sergeys, of Ethyl Corp.

It was planned, the report says, to put the process into full use in a plant at Heydebreck for the production of 6,000,000 lb. of ethylene a month, but the war ended before the plant was completed.

Most interesting and valuable aspect of the development, Sergeys says, "was the use of a copper ni-

REFINERS INSPECT NEW UNIT IN KANSAS REFINERY

Shown here inspecting the new Perco catalytic desulfurization-reforming unit in the McPherson, Kans., refinery of National Cooperative Refinery Association are: E. J. Mary, general manager, N.C.R.A.; F. W. McCurry, vice president in charge of manufacturing, Derby Oil Co.; John S. Wertz, president, J. B. Smith, vice president, and A. M. Schrepfer, refinery superintendent, all of Vickers Petroleum Co., Inc.; and M. W. Conn, Perco Division, Phillips Petroleum Co. After several months of experimental operation on various types of stocks the unit was demonstrated late last week to more than 70 operators and executives from refinery organizations in the West and Middle West. Phillips Petroleum Co.'s Perco Division and the N.C.R.A. were hosts to the group. A description of the unit's experimental and commercial operations will appear in an early issue of The Oil and Gas Journal

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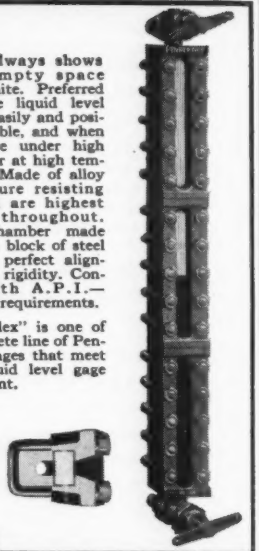

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Each step of the process is described. A flow sheet, furnace diagram, a graph showing the time rate of ethylene absorption, yield tables, and other data are included in the report, of which photostat copies sell for $3 and microfilm copies, $1.50.

Gilcrease Oil Purchases Meraux Petroleum's Plant

Gilcrease Oil Co., San Antonio, Tex., has purchased the 6,000-bbl. skimming plant of Meraux Petroleum Storage Co. of New Orleans. The plant, which is located at Arabi, La., on the Mississippi River 10 miles below New Orleans, will be reconditioned before going into operation July 15, according to Eugene L. Ames, president of Gilcrease.

Allen M. Peairs, refining engineer of Dallas, has been named manager of the refinery. Charles Davis, who has been transferred from the company's San Antonio office, has been named office manager.

The Gilcrease plant will process crude oil from the company's producing properties in Texas.

Use of Synthetic Rubber Shows March Increase

Consumption of synthetic rubber by domestic manufacturers in March amounted to 38,129 long tons, an increase of 7.79 per cent over the consumption for February and a decline of 31.32 per cent from that in March a year ago.

Consumption for March of synthetic rubber by types was: GR-S, 29,713 long tons; Neoprene, 3,127 long tons; Butyl, 4,736 long tons; and GR-A (N types), 553 long tons.

Natural-rubber consumption for March was 54,230 long tons as compared to the synthetic rubber consumption of 38,129 long tons for the same period.

A. S. T. M. Approves Revised Fuel-Oil Specifications

The American Society for Testing Materials has approved revised specifications for fuel oils to carry the A.S.T.M. designation D 396—48 T. Five grades of fuel oil for various types of burning equipment are covered in the specifications.

The new specifications resulted from a study conducted by technical committee E on burner fuel oils of A.S.T.M.'s Committee D-2. The subcommittee, together with the burner industry, conducted extensive tests on the burning characteristics of the fuel oils.

Du Pont Plans Huge Expansion Program

A $30,000,000 expansion of research facilities at the du Pont Co. experimental station at Wilmington, Del., is being planned by the company. The proposed expansion would make the station one of the largest research establishments in the world.

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Exploration and Drilling

W. Texas-S. E. New Mexico Producing Area Expanded

EVENTS of the past few weeks show the producing area of the Permian basin in West Texas-Southeast New Mexico expanding in all directions so rapidly that it comes more nearly being an explosion of the boundaries than extensions.

To the north, things have been happening in Hale County, Texas; on the east in Sterling and Coke counties; to the southeast in Schleicher County; southwest in Reeves County; and to the northwest in northern Lea County, New Mexico. Meantime, as if to show that the Central Basin Platform area is still going strong, Dollar Hide field in Andrews County had a ½-mile north extension with a dual completion in the Silurian and Devonian. This field incidentally begins to look more and more like a major field, 100 million barrels or more.

In Hale County, four locations have been made around General American Oil Co. 1 A. F. Byrd, which was completed for 118 bbl. in the Pennsylvanian, after having been once abandoned in granite back in 1941. The offset to the 1 well in West Petersburg pool in the same county reached the pay and was preparing to drill-stem test.

In Sterling County, Anderson-Prichard Oil Corp. et al 1 Foster tanked 615 bbl. of oil in 14 hours from the Wichita-Albany pay in the Permian. Coke County now has Ellenburger production in the east central part of the county, as Seaboard Oil Co. of Delaware and Southern Minerals Corp. 1 Reed, NE SW Section 1, HE&WT Survey, 10½ miles southeast of Robert Lee, flowed 15 to 20 bbl. of 47°-gravity oil from Ellenburger on drill-stem test at 6,184-6,200 ft.

Schleicher County had a test with possible earmarks of an edge well in Phillips Petroleum Co. 1 Waddell, NE Section 72, Block M, GH&SA Survey, 17 miles northeast of Eldorado. Twice it has swabbed and flowed some oil, mud, and acid water from a Strawn pay at 5,630-5,700 ft.

On the southwest side, in Reeves County, Argo Oil Corp. 1 Clyde Ikins, Section 299, Block 13, H&GN Survey, recovered 11 ft. of core from the interval at 10,690-10,708 ft. (probably Wolfcamp); 8 ft. of lime and conglomerate, 3 ft. of sand, bleeding gas throughout. This test is 1½ miles southwest of the same company's 1 Dora Roberts, discovery well in the Wolfcamp of Verhalen pool.

To the northwest, in northern Lea County, Mid-Continent Oil Corp. 1-A Sawyer, pre-Permian pay discovery of Crossroads pool, is good for about 4,000 bbl. daily through ¾-in. choke at 12,115-12,215 ft. The extension well at Dollar Hide is Pure Oil Co.-Humble Oil & Refining Co. 4-D-S E. P. Cowden, Section 24, Block A-52, Public School Lands.

The Permian basin area is slated for a large increase in pipe-line outlets as fast as the companies can get pipe for projects building and planned. At the present pace of exploration expansion, the pipe-line project plans may have to be reexamined. *(For previous articles on some of these wells, see The Oil and Gas Journal, November 15, 1947, page 338; January 29, 1948, page 325; February 26, 1948, page 171; April 15, 1948, page 129; and May 13, 1948, page 443.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN.—On test of the upper Leo at Little Buck Creek, Niobrara County, Wyoming, Continental Oil Co.'s 12 ELCU "B" recovered 1,400 ft. of oil in 10 minutes, but the lower section of the sand showed water. This is the first deep test in this field. Texas Co.'s second Adon well, Campbell County, Wyoming, is running high structurally, but no test has been made. North Dakota activity is being revived with several lease blocks taken in recent months.

PERMIAN.—In New Mexico, Mid-Continent's Lea County discovery flowed 170 bbl. of oil an hour on completion tests, opening the Crossroads field. Three offset locations have been made, each to be drilled to at least 12,500 ft. In Texas, Humble Oil & Refining Co. 1-B Ellwood, Sterling County Ellenburger well recovers oil on drill-stem test. Southern Gaines County has a new Devonian producer at Texas Co.'s 1 Jenkins.

EAST TEXAS.—Bridewell & Jackson 1 McKenzie, sub-Clarksville discovery northeast of Alba townsite in Wood County, pumped 110 bbl. of oil in 24 hours after being shut in to install pump. Observers expect it to make a 50-bbl. well. Reworked test north of town was nearing 3,000 ft., in drilling to the discovery's pay level of 4,025-4,123 ft.

NORTH TEXAS.—Kingwood Oil Co. wildcat in northwest Wise County logs oil show in Caddo limestone from 5,213-23 ft. Mitchell 1 Partney, first Marble Falls producer for Shackelford County, is ready for completion attempts.

SOUTH LOUISIANA.—Stanolind Oil & Gas Co. announced plans for a 12,500 ft. exploration 10 miles off the Cameron Parish shore line in the Gulf of Mexico. The test will be 1 Louisiana State Lease, 1,133, Block 45, Tract 2,362. The Texas Co. 12 State-Cote Blanche Island, Lease 340, has been completed as a discovery well in the Cote Blanche Island area of St. Mary Parish, located in West Cote Blanche Bay, Township 15s-7e. The well flowed 6 bbl. of 56.8°-gravity condensate per day with 7,700,000 cu. ft. of gas through a 10/64-in. choke. Total depth is 13,824 ft. with perforations at 13,300-58 ft.

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SOUTHWEST TEXAS

Bastrop County Gets New Field Discovery

CORPUS CHRISTI.—A new oil field discovery in Bastrop County, 5 miles north of the Bastrop-Travis County line, has been opened at James E. Smith 1 Caldwell. Drilled to a total depth of 1,647 ft., this well gaged 30.9 bbl. of oil per day on pump, with no gas or water, through open hole at 1,608-47 ft. Top of the pay zone, which is a conglomerate or serpentine, chalk, and lime, was at 1,600 ft., with 4½-in. casing set to 1,608 ft. This well is in Jose A. Navarro Grant.

Magnolia Petroleum Co. 3 Duval Ranch-State, gaged 20,000,000 cu. ft. gas per day on open flow to open a new gas sand in Seventy Six field of Duval County. Total depth is 2,503 ft., with top of sand 2,091 ft. Perforations for completion were made from 2,100-10 ft. Shut-in pressure is 727 psi.

Sun Oil Co. 1 Bentsen Brothers, wildcat approximately 4 miles south of the La Reforma field in Starr County, recovered three stands of oil on drill-stem test at 5,956-61 ft., through ¼-in. chokes, developed 300 psi. working pressure. On test at 5,992-96 ft., using ¼-in. chokes, open 15 minutes, 73 psi. working pressure, recovered 220 ft. of oil and 20 ft. of salt water. Operators are drilling ahead below 6,320 ft. This well is in Section 3, G. O. Newman Subdivision.

R. F. Schoolfield & H. J. Gravis 1 J. F. Welder Heirs, new discovery approximately 1 mile south of Seven Sisters field and 2 miles north of Loma Novia field, in Duval County, gaged 44 bbl. of oil per day on pump. Production is through open hole at 2,660-82 ft., with oil sand logged at 2,663-67 ft.

Magnolia Petroleum Co. 1 Luella Proctor, new pay sand discovery and southeast extension well at La Gloria field in Brooks County, flowed 26.8 bbl. of clear condensate and 2.8 bbl. of water per day plus 1,532,000 cu. ft. of gas, with ratio of 57,164, 1,140 psi. working pressure, through a ¼-in. choke, through perforations at 9,790-9,800 ft. Additional perforations were made from 9,780-90 ft. and operators are waiting on potential gage.

The 49 new locations reported for Districts 1 and 4 included 14 wildcat starts, 2 each in Atascosa, Edwards, and Jim Wells counties, and 1 each in Caldwell, Duval, Frio, La Salle, Milam, Starr, Willacy and Williamson counties. Four successful wildcats were completed to open two new oil pools, one each in Bastrop and Nueces counties, and two new pays, one each in Seventy-Six field, Duval County, and La Reforma pool, Starr County. Twelve wildcats were dry, three each in Edwards and San Patricio, two in Williamson, and one each in Caldwell, Duval, Milam and Nueces counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Bastrop County: New oil discovery—James E. Smith 1 T. J. Caldwell, in Jose A. Navarro Grant, 5 mi. N of Cedar Creek, 1½ mi. SE of Travis County line, top pay 1,605 ft., TD 1,647 ft., open hole 1,608-47 ft., IP: 31 bbl. oil per day on pump, no gas, no water.

Duval County: New gas pay Seventy Six field—Magnolia Pet. Co. 3 Duval-State, GCSD&RGNG RR Sur. 76, top pay 2,091 ft., TD 2,503 ft., perf. 2,100-10 ft., IP: 20,000,000 cu. ft. gas per day on open flow, dry gas, shut-in pressure 727 psi., no water.

Nueces County: New oil discovery—Rock Hill Oil Co. and W. Earl Rowe 2 E. D. Wood, 2 mi. E of Riverside field and 2½ mi. W of Calallen, top pay 7,482 ft., TD 7,803 ft., perf. 7,490-94 ft., IP: 120 bbl. oil per day through 7/64-in. choke, GOR 797, TP 1,165 psi., CP 1,280 psi., gravity 41°, no water.

Starr County: New gas-condensate pay La Reforma pool—Baldridge & King et al 1 A. Guerra Unit, in Santa Cruz Grant, top pay 8,553 ft., TD 8,594 ft., perf. 8,553-82 ft., IP: 28,000,000 cu. ft. gas per day on open flow, with condensate, shut-in pressure 5,775 psi., no water.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Caldwell County: Preston Laws & Howard Laws 1 Felipe Mareon, in Isaac Allen Sur., 2½ mi. S of Lytton Springs, in Lost Mule area, dry, TD 1,856 ft.

Duval County: Cam Corp. 7 G. N. Olson, Block 28, Share 4, El Mesquite Grant, 5 mi. NW of Hebbronville, and 4½ mi. S-SE of Cam field, dry, TD 3,125 ft.

Edwards County: Creslenn Oil Co. 1 L. J. Wardlaw, GC&SF Sur., Block B, 20 mi. NW of Rock Springs, dry, TD 1,005 ft.

L. R. Gililland 1 J. T. Evans, Wardlaw area, GC&SF Sur., Block L, 30 mi. W of Rock Springs, dry, TD 330 ft.

Hollingsworth & Wilborn 1 S. N. Brown, GWT&P RR Sur. 66, Block 3, 15 mi. SW of Rock Springs, dry, TD 480 ft.

Milam County: H. G. Dickinson 1 Mrs. Jack Clements, in Justo Liendo Sur., 3 mi. E of Thorndale, dry, TD 1,742 ft.

Nueces County: Southern Minerals Corp. 2 J. B. Butts, in F. Z. Bishop Subd. of Petronvilla Ranch, 5 mi. E-SE of Bishop and 5½ mi. W-SW of Luby field, dry, TD 7,510 ft.

San Patricio County: Great Lakes Carbon Corp. 1 E. D. DuBose, Sec. 71, Geo. H. Paul Subd. of J. J. Welder Ranch, 5 mi. SW of Papalote, dry, TD 5,981 ft.

Republic Nat. Gas & Union Oil Co. of Calif. B-1 J. H. Ewing, Sec. 24, Geo. H. Paul Subd. of Coleman-Fulton Pasture Co. Lands, 2 mi. S of Sinton, dry, TD 7,503 ft.

Southern Minerals Corp. 4 Katherine Clifton, in James B. Wilson Sur., 1 mi. S of Tynan, dry, TD 4,700 ft.

Williamson County: Mid-Tex Oil Corp. of Pharr 1 Albert Freels, in Williford Cart-

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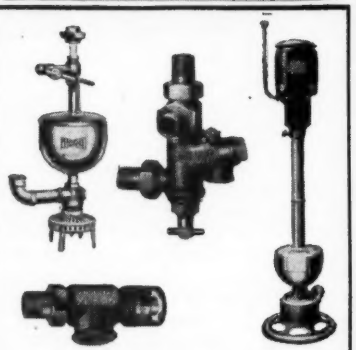

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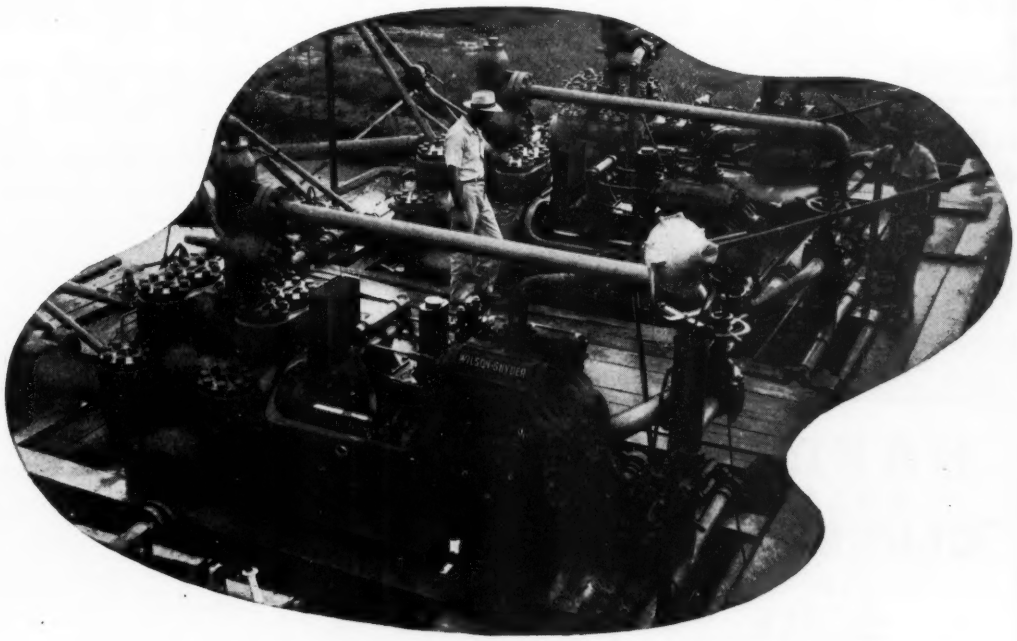

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wright Sur., 3 mi. SE of Thrall field, dry, TD 1,470 ft.

H. J. Steward 1 Becker-Brinkmeyer, P. Stoddard & Castleberry Sur., 10 mi. SE of Taylor, 5 mi. SW of Thrall, dry, TD 1,435 ft.

MISSISSIPPI

Well in Brookhaven Field Completed for 140 Bbl.

JACKSON.—Sun Oil Co. 2 D. Crump, in Brookhaven field, Lincoln County, 9-7n-7e, has been completed on the pump for 140 bbl. of oil per day. Perforations for completion were made at 10,410-20 ft.

At La Grange field, Adams County, W. J. O'Brien 2 R. Lee Parker, 8-6n-2w, was completed through perforations at 6,224-30 ft. Initial production is not available as this well is flowing into tank with the No. 1 well. The Wilson sand was topped at 6,223 ft.

Mallalieu field, Lincoln County, received two producers. Humble Oil & Refining Co. C-1 J. M. Summers et al, 7-6n-8e, was completed for initial production of 190 bbl. of oil per day, through perforations at 10,532-65 ft. Lion Oil Co. 1 O. C. Grenn, 20-6n-8e, flowed 723 bbl. of oil through 20/64-in. choke through perforations at 10,450-64 ft.

The 12 new locations reported this week included 5 wildcat starts, 1 each in Copiah, Franklin, Lamar, Rankin, and Walthall counties. LaGrange field, Adams County, received four development locations, with one each for Gwinville field, Jeff Davis County; Soso field, Jones County; and Yellow Creek field, Wayne County.

MISSISSIPPI WILDCAT FAILURE

Hinds County: Gulf Refg. Co. 1 H. C. Burgess et al, 10-7n-2w, dry, TD 4,757 ft. in salt. Tops: Wilcox 2,279 ft., Midway 3,900 ft., chalk 4,011 ft.

ALABAMA WILDCAT FAILURE

Barbour County: Massengill & Williams 1 T. R. Grubbs, 9-11n-26e, dry, TD 3,384 ft. Did not run electric log.

FLORIDA WILDCAT FAILURE

Washington County: D. E. L. Byers 1-A Alfred Brothers, 31-2n-13w, dry, TD 4,826 ft.

CALIFORNIA

Kern County Gets Another Oil Pool

LOS ANGELES.—Independent Exploration Co. has opened another new oil pool in the McDonald anticline area of Kern County with its 2 Layman, 18-28s-20e. Bailing tests of the well have proved it to be capable of light-gravity commercial production, but as yet it is too early to estimate the potential production. Productive zone in the new discovery is the Gould sand at a depth of 1,370-1,405 ft. Even a small production at this shallow depth would mean a commercial well. However, operators are of the opinion that the potential of this first well will not be as high as may be expected in subsequent wells, as the 2 Layman was completed by cementing casing solidly through the productive zone and then perforating for production tests. Generally in shallow low-pressure wells such as this a regular slotted liner results in better production.

Also creating excitement during the past week were reports that the Jergins Oil Co. and North American Oil Co. combination has cored nearly 100 ft. of excellent-appearing oil sand in their 1 Orradre, 12-23s-10e. This venture is in the San Ardo area of Monterey County, about 3 miles north of San Ardo field. This field, uncovered a few months ago by The Texas Co., currently is the only field in the county and has only three producing wells, all in the 35 to 80-bbl.-per-day class. The saturated sand reportedly cored in the 1 Orradre was found at a depth of 2,120-2,225 ft., and operators have set casing for an immediate production test. If the sand is as good as field reports indicate, this is the first well in the area that looks as if it might lead to a major discovery.

Hugh A. Bardeen has been credited with a new oil-field discovery in the Puente Hills area of Los Angeles County. According to latest reports, his 1 Lautenbach, 10-2s-10w, has bailed 16°-gravity crude at the rate of 50 bbl. daily. Operator is now rigging pump to complete the well. The new discovery is located in rank wildcat territory and is about 18 miles north of nearest production in Montebello field of the Los Angeles County.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, McKittrick area: The Texas Co. 15-29 Westpet Unit Two, 29-30-22e, flowed gas and condensate at unestimated rate, 33 ft. perf. liner landed 4,508 ft., TD 4,880 ft.

Paloma area: Ohio Oil Co. 41-30 KCL-B, 30-31s-26e, flowed 350 bbl. oil and 2,375,000 cu. ft. gas daily, gravity 50.2°, water cut 0.1 per cent, perf. 10,845-60 ft., 10,870-10,915 ft., 11,015-64 ft., TD 11,167 ft.

San Luis Obispo County, Guadalupe area: Continental Oil Co. 2 Sand Dune-Le Roy, 2-10n-36w, pumped 389 bbl. daily, water cut 56 to 92 per cent, 86 ft. perf. liner landed 2,699 ft., TD 2,759 ft.

Ventura County, Montalvo area: Standard Oil Co. 62-4 McGrath, 30-2n-22w, flowed 406 bbl. in 10 hours, gravity 30.1°,

water cut 0.8 per cent, perf. 8,809-76 ft., 8,909-9,014 ft., 9,141-9,229 ft., TD 9,314 ft.

Ojai area: Richfield Oil Co. 54 Ojai, 14-4n-22w, flowed 188 bbl. daily, gravity 24.2°, water cut 25 per cent, 2,243 ft. perf. liner landed 3,999 ft., TD 4,000 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Los Hills area: Universal Consolidated Oil Co. 1 Bates, 22-26s-20e, dry in Etechegoin clay, elev. 463 ft., TD 2,934 ft.

Salt Creek area: Carneros Oil Co. 2 Anderson, 20-29s-21e, dry in gray sand, elev. 1,000 ft., Brown shale 1,280 ft., TD 2,200 ft.

Orange County, Brea-Olinda area: Union Oil Co. 1 Gaines, 10-3s-9w, dry, elev. 851 ft., TD 6,231 ft.

San Luis Obispo County, Temblor area: Continental Oil Co. 1 British-American-Dobbs - Thomas Unit, 22-30s-20e, dry, elev. 2,950 ft., TD 5,028 ft.

Ventura County, Montalvo area: Richfield Oil Co. - Ballard Mee, 20-2n-22w, dry, elev. 50 ft., TD 9,864 ft.

SOUTH LOUISIANA

New Gas-Well Discovery In Gulf for Magnolia

NEW ORLEANS.—A new gas-well discovery in the Gulf of Mexico off Terrebonne Parish, has been completed at Magnolia Petroleum Co. 1 Ship Shoal, Lease 766, Block 72. On a test through perforations at 7,268-7,300 ft. using 6/64-in. choke, flowed at a rate in excess of 1,000,000 cu. ft. of gas per day, with 2,700 psi. pressure. This well is on a salt dome 8 miles off Raccoon Point of Isle Derniere. Salt was encountered at 8,290 ft. and the first test at 7,320-22 ft. brought a flow of gas and salt water. The first gasser in the Gulf was discovered earlier in the year by Barnsdall Oil Co. near Breton Island, Plaquemines Parish. The new Magnolia discovery is approximately 13 miles directly east of the only oil well brought in to date in the Gulf.

A new producing horizon for Bully Camp field in Lafourche Parish, has been opened by Gulf Refining Co. 20 Delta Securities Co., 36-19s-21e. Drilled to a total depth of 10,136 ft., with perforations at 7,788-7,798 ft., flowed on potential test 210 bbl. of 35.9°-gravity oil per day through a ⅛-in. choke with 1,725 psi. flowing pressure on the tubing. Gas oil ratio was 1,220, and 0.2 per cent water. The 7-in. casing is set at 6,764 ft. and a 5-in. liner was cemented to 7,900 ft.

Superior Oil Co. 3 LLE-State, Unit 12, 24-21s-16e, has opened a third producing level for gas and condensate production at Four Isle dome in Terrebonne Parish. Total depth is 11,504 ft., with casing set at 10,982 ft. Perforations were made at 10,749-10,764 ft. and 10,370-10,385 ft. and flowed gas and condensate from each level. Pipe was then perforated in the third level at 9,950-9,965 ft. and completed for a flow of 166 bbl. of condensate per day through a 22/64-in. choke along with 8,892,000 cu. ft. of gas per day. Flowing pressure on the tubing was 3,585 psi., 49.1°-gravity condensate, showing 0.8 per cent water.

Thirteen new locations were reported this week with 2 being wildcat starts, 1 each in Plaquemines and St. Landry parishes. Three successful exploratory tests were reported opened new gas pool in Plaquemines Parish and oil sands, 1 each for Iota pool, Acadia Parish, and Bully Camp field, Lafourche Parish. One wildcat was dry in Acadia Parish.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Acadia Parish: New oil pay Iota pool—Sohio Pet. Co. 1 D. A. Burnell, 14-8s-2w, TD 9,300 ft., top sand 8,666 ft., perf.

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8,666-98 ft., IP: 292 bbl. oil per day through 10/64-in. choke, GOR 565, TP 1,100 psi., gravity 31.8°, no water.

Lafourche Parish: New oil sand Bully Camp field—Gulf. Refg. Co. Delta Securities Co., 3A6-19s-21e, TD 10,136 ft., top sand 7,788 ft., perf. 7,788-98 ft., IP: 210 bbl. oil per day through a ⅛-in. choke, GOR 1,220, TP 1,725 psi., gravity 35.9°, 0.2 per cent water.

Plaquemines Parish: New gas pool—Barnsdall Oil Co. 1-35 Breton Sound area, 11 mi. NE of Grand Bay field production, in Block 36, TD 10,600 ft., top sand 4,130 ft., perf. 4,130-42 ft., IP: 2,360,000 cu. ft. gas per day through ¼-in. choke and shut in, TP 1,620 si., no water, dry gas.

SOUTH LOUISIANA WILDCAT FAILURE

Acadia Parish: The Union Sulphur Co., Inc., 1 Acadia Baptist Academy Unit "A," 24-7s-1e, 6,850 ft. NE of South Bayou Mallet production, dry, TD 9,518 ft.

APPALACHIAN FIELD

Eight New Locations In Pennsylvania

PITTSBURGH.—Towards the southern end of Chestnut Ridge north of the West Virginia state line in Springhill Township, Fayette County, Pennsylvania, New Penn Development Co. et al topped the Oriskany sand at 7,936 ft. in the wildcat on J. R. Smiley farm and 21 ft. in that formation there was no showing of production. The surface elevation is 2,310 ft. with the Onondaga chert logged at 7,795 ft.

New locations for the week totaled 8 and in South Bend and Valley townships, Armstrong County; Monroe Township, Clarion County; Washington Township, Indiana County; Beaver and Ringgold townships, Jefferson County.

In Ravenswood district, Jackson County, West Virginia, near the town of Silverton, F. S. Deem completed the test on Della Bowman farm and it was confirmed good for 50 bbl. a day from the Berea, total depth 2,131 ft. Several other completions are expected in the area within the week.

There is considerably more wildcatting under way in West Virginia in recent years and it is well scattered throughout the state. While a few are approaching deep producing horizons, the greater number are just starting and will not log important horizons for weeks. The ratio of success in West Virginia wildcats is low but new exploration is being done chiefly by large companies after considerable research.

New locations in West Virginia totaled 14 and in Washington district, Calhoun County; Poca district, Kanawha County; Union district, Marion County; Webster district, Marshall County; Jefferson district, Pleasants County; Pocatalico, Teays Valley and Union districts, Putnam County; Buchannon district Upshur County; Grant district, Wayne County; Church district, Wetzel County; Steele district, Wood County.

PENNSYLVANIA SUCCESSFUL WILDCATS

Jefferson County, Ringgold Township: Stahlman & Nosker 1 Elias Buzzard, 225,000 cu. ft. gas, TD 1,376 ft.

Westmoreland County, Allegheny Township: Peoples Natural Gas Co. 1 Frank Mailki, 800,000 cu. ft. gas, Speechley sand 2,820 ft., gas 2,823 ft., TD 2,826 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Jackson County, Ravenswood district: F. S. Deem 1 Della Bowman, 50 bbl., Berea, TD 2,131 ft.

WEST VIRGINIA WILDCAT FAILURE

Wyoming County, Chester district: Godfrey L. Cabot, Inc., 1,265 Robert Bailey, dry, Big lime 2,517 ft., Injun 2,958-3,025 ft., Berea 3,634-44 ft., TD 3,696 ft.

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CANADIAN FIELDS

Drilling Slackens In Leduc Field

CHATHAM. — Immediately prior to the blowout of Atlantic Oil 3, LSD 12, 23-50-26w4, considerable drilling in Leduc field had been shut down owing to muddy roads and flood conditions. Several wells were, however, in various stages of completion.

Extending the field to the south, Continental-Leduc 2, LSD 1, 9-50-26w4, at 5,420 ft., started with a flush of more than 112 bbl. an hour of clean oil and was being shut down to the D-3 allowable of 150 bbl. a day.

Home-Leduc 7, LSD 13, 21-50-26w4, in a 45-minute test of the D-2 zone at 5,030-5,100 ft. got 520,000 cu. ft. gas and a 2,340-ft. oil rise and started to deepen to the D-3 zone. Globe-Leduc 7, LSD 5, 19-50-26w4, is waiting for swab.

Imperial 52, LSD 16, 20-50-26w4, in open flow test of D-3 zone at 5,329 ft. flowed at the rate of 3,190 bbl. a day and is being put on restricted flow. Imperial 48, LSD 9, 22-50-26w5, is standing cemented at 5,230 ft. Imperial 56, LSD 6, 34-50-26w4, is testing at 5,302 ft.

Volmer.—Imperial-Volmer 1, LSD 2, 16-55-25w4, north and east of Leduc field, and 12 miles north of Edmonton, is below 4,651 ft., after testing D-2 zone of the Devonian limestone, and getting sulfur water. The well is being carried down to test the D-3 zone.

Taber.—In Taber field, southern Alberta, California Standard Taber-Province 72-15A, LSD 4, 15-9-17w4, has finished at 3,326 ft. with initial production around 60 bbl. of 22°-gravity crude. Taber-Province 76-15A, LSD 12, 15-9-17w4, at 3,214 ft., has approximately the same production.

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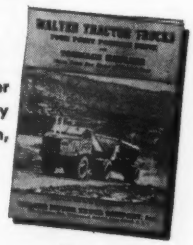

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WALTER TRACTOR TRUCKS

Manyberries. — In the Manyberries gas area in southern Alberta, opened last year in a series of joint tests by McColl-Frontenac Oil Co. and Union Oil Co. of California, the same companies are resuming their joint drilling program. McColl-Union 11A-21 has location in LSD 11, 21-2-3w4, about 20 miles southwest of Manyberries. Several gas wells, completed last year, are shut in.

Turner Valley. — In the Turner Valley north extension, Foothills Oil & Gas 27, LSD 9, 4-21-3w5, is below 9,768 ft. and nearing completion, with Madison lime contact at 9,504 ft. Five other tests are drilling in the north and north extension areas.

Gulf operations.—Exploratory work for Canadian Gulf Oil Co. is being carried on from headquarters at Cardston with G. J. Blundun as engineer in charge. Several crews, some of whom worked in the Pincher Creek area in 1945-46 are carrying on geological and seismographic work over an extensive area in southern Alberta on an east and west line from Milk River Ridge to Waterton River.

In northwestern Alberta the same company is planning to start preliminary work in the district surrounding Grande Prairie, with crews operating from that town.

Lloydminster.—In the Alberta section of the Lloydminster field, Granleduc 3, LSD 7, 14-50-2w4, has finished at 1,975 ft. and is preparing to test. Pacific Western C.P.R. 1, LSD 14, 1-51-3w4, testing a potential extension of the field to the north and west, has finished at 2,024 ft. with about 7 ft. saturation in the Sparky sand, and is testing. Imperial-H. B. Blackfoot 5, LSD 8, 23-50-2w4, is standing cemented at 1,968 ft. No. 6 is drilling in LSD 7, same section.

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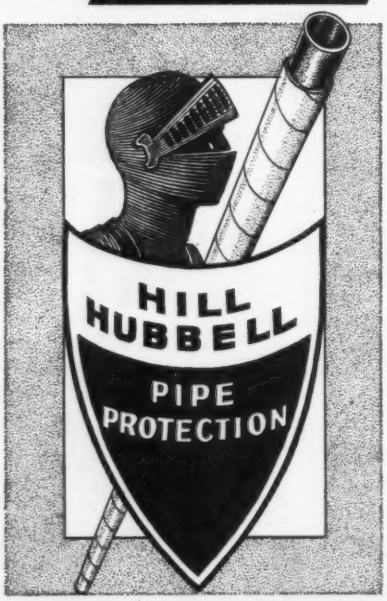

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N. CENTRAL TEXAS

First Marble Falls Pay For Shackelford County

WICHITA FALLS.—Shackelford County's first Marble Falls producer, M. J. Mitchell 1 T. C. Partney, 2 miles south of Albany, was ready for completion tests through casing perforations from 4,322-32 ft. Operators were running tubing. The well was drilled to the Ellenburger at 4,620 ft., then plugged back and casing set at 4,487 ft.

In southeastern Shackelford County, Marble Falls production was in prospect at Phillips Petroleum Co. 1 Reaves-Hickman unit, on the west side of Sedwick (Ellenburger) field. A drill-stem test in conglomerate at 3,922-34 ft. showed gas at the surface in 3 minutes and recovered 800 ft. of oil. It was to be drilled to the Ellenburger, expected around 4,200 ft., before making further tests.

Two miles northwest of Bridgeport, Mid-Continent Petroleum Corp. 1 Kaker, S. Wood Survey, Wise County, was drilling below 7,125 ft. in dolomite, with no shows reported. Top of the Ellenburger was placed at 6,997 ft. Southwest of the Chico discovery, Cities Service Oil Co. 1 Berry, perforated the conglomerate between 5,210-24 ft., acidized, and swabbed 1 bbl. of oil an hour.

Kingwood Oil Co. was preparing to drill-stem test a section of the Caddo, to 5,284 ft., total depth, at its 1 Garrett, in the C. W. Egery Survey, 4 miles northwest of Chico in Wise County. Top of the Caddo was 5,204 ft., and cores from 5,213-23 ft. were said to have oil shows. No reports were available on a core from 5,223-39 ft.

In Nolan County, Sohio Petroleum Co. et al 1 Sears, Section 60, Block 21, 1½ miles southeast outpost to the same company's Ellenburger discovery, 4 miles east of Sweetwater, reported top on the Ellenburger at 6,140 ft. and was running electrical survey to 6,286 ft., total depth, after two drill-stem tests failed. Heaving shale prevented the tool from reaching bottom on the first attempt, and packer failed after 10 minutes on the second try, run from 6,233-86 ft. Recovery in the 10 minutes was 1,200 ft. of drilling mud.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Archer County: Henry Grace Production Co. 1 S. Boykin, Blk. 65, Harris Subd., 7 mi. W Archer City, dry, TD 1,499 ft., sand with oil show 1,233 ft., Gunsight lime with oil show 1,454 ft., oil show 1,487 ft.

G. E. Kadane & Sons 1 Maxey, Sec. 1,844, TE&L Sur., 4½ mi. SW Windthorst, dry, TD 3,279 ft., Gunsight lime 1,013 ft. with oil show.

Callahan County: Oil Well Drilling Co. et al 1 Ace Hickman, Sec. 149, BBB&C Sur., 7 mi. SE Baird, dry, TD 4,389 ft., Palo Pinto 2,422 ft., Caddo 3,623 ft., Ellenburger 4,291 ft., PB 1,190 ft., oil sand tested salt water.

Clay County: Cecil Catlin 1 Taylor, E. T. Mitchell Sur., 3 mi. NW Charlie, dry, TD 380 ft.

Coleman County: Collier & Hurd 1 Mrs. M. E. Timmins, Buenita Alderata Sur. 275, 2 mi. NE Rockweed, dry, TD 2,135 ft., gas shows 596, 1,300 ft., Caddo 1,413 ft., Ranger 1,929 ft.

Mohawk Drilling Co. 1 J. L. Wilkinson, Sec. 3, Blk. 2, GH&H Sur., 3 mi. N Coleman, dry, TD 1,815 ft., sand with oil show 1,805-15 ft.

Fisher County: Exploration Drilling Co. 1 H. S. Newman, Blk. 12, John Rodman Sur., 3 mi. S Roby, dry, TD 6,318 ft., Noodle Creek 3,275 ft., Swastika lime 4,048 ft., Mississippi 6,115 ft., Ellenburger 6,145 ft., elev. 1,985 ft.

Hunt Oil Co. 1 W. J. Kemp, Sec. 54, HT&B Sur., 1½ mi. SW McCaulley, dry, TD 3,852 ft., Saddle Creek 3,275 ft., Coal

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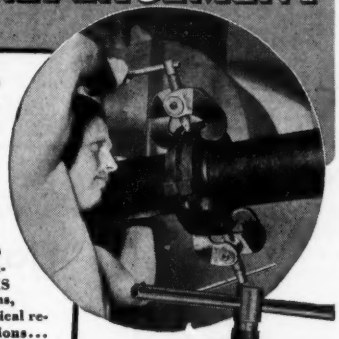

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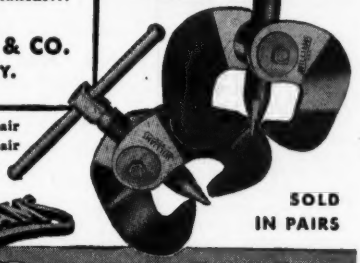

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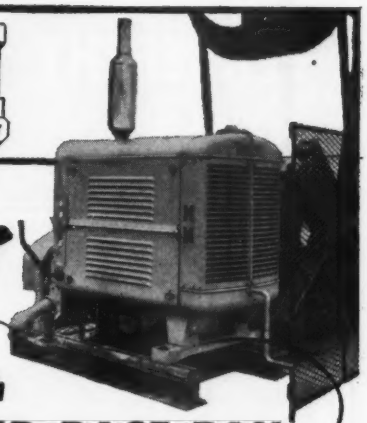

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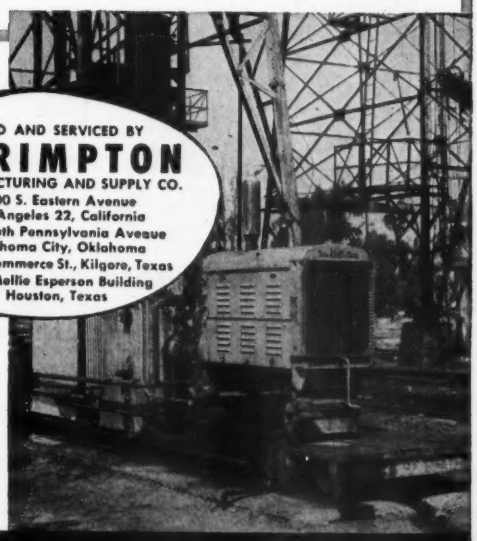

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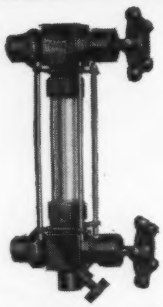

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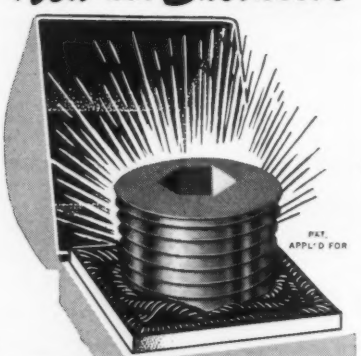

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3,326 ft., Noodle Creek 3,048 ft., Flippen 3,346 ft., elev. 1,906 ft.

Haskell County: Bridwell Oil Co. 1 A. C. Thane, A. Jones Sur., Sec. 114, 9 mi. E Stamford, dry, TD 3,298 ft., Adams lime 2,662-95 ft.

Jones County: West Central Drilling Co. et al 1 J. H. Irion, J. S. Hail Sur. 2, 10 mi. N Merkel, dry, TD 3,515 ft., coal 2,998-3,001 ft., soft lime 3,059-63 ft.

TEXAS GULF COAST

Sunray Opens New Gas Condensate Pool

HOUSTON.—In Goliad County, approximately 6½ miles north-northwest of Goliad townsite, Sunray Oil Corp. 1 Fannie O. Marshall opened a new gas-condensate pool. Drilled to a total depth of 9,240 ft., with perforations at 8,730-45 ft. in the Luling sand, the well flowed a potential gage of 518 bbl. of condensate per day through a ⅜-in. choke, with 2,325 psi. tubing pressure and casing sealed. The shut-in pressure is 2,905 psi., and the estimated open-flow gas potential is 10,000,000 cu. ft. gas per day. This well is located in William Millican Survey, A-201, 6 miles southwest of Weesatche and 2½ miles east-southeast of Poehler field.

A new deep pay for Lolita field in Jackson County has been opened by Humble Oil & Refining Co. D-3 Four-way Ranch, in I&GN Survey. Top of pay was encountered at 7,556 ft., and perforations were made from 7,556-64 ft. for completion. Total depth is 8,020 ft., and initial production was 134 bbl. of oil per day through a ⅛-in. choke. Gravity 44°.

Union Producing Co. 1-A Wm. Borchers opened a new gas pool in Lavaca County. On initial production test the well gaged 5,000,000 cu. ft. of gas per day on open flow, dry gas, with shut-in pressure 865 psi. No water in the flow. Total depth is 11,207 ft., and production is through perforations at 2,030-40 ft.

In Lee County, Humble 2 Geo. D. Vick et al, in Bethel Smith 1/3rd League, opened the new Tanglewood oil pool. This field is in the northeast portion of county. Total depth is 6,345 ft., and initial production is 10 bbl. oil per day on pump, gas-oil ratio 2,289, gravity 31.3°, and 4 bbl. of salt water per day. Production is through perforations in the Edwards lime at 6,332-41 ft.

Burnell-Wilcox field in Karnes County has been extended on east flank by Stanolind Oil & Gas Co. 1 J. E. Steed. It flowed 86 bbl. of oil per day through a 3/32-in. choke, through perforations at 6,863-68 ft. Total depth 6,895 ft. Well is located in D. B. Choate Survey.

There were 49 new locations reported this week of which 11 are wildcat starts, 3 in Refugio, 2 in San Jacinto, and 1 each in Bee, Chambers, DeWitt, Goliad, Harris, and Jefferson counties. Four successful exploratory tests were reported, opening new oil pool for Goliad County, one gas pool for Lavaca County and one oil pool for Lee County, and a new pay for Lolita field in Jackson County. Thirteen wildcats were dry, one each in Brazoria, Calhoun, Fayette, Fort Bend, Goliad, Gonzales, Grimes, Jackson, Jefferson, Matagorda, Montgomery, Victoria, and Washington counties.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Goliad County: New gas-condensate field—Sunray Oil Corp. 1 Fannie O. Marshall, in William Millican Sur., 5.8 mi. SW of Weesatche, 6½ mi. N-NW of Goliad, and 2½ mi. E-SE of Poehler field, top 8,730 ft. (Luling sand), TD 9,240 ft., perf. 8,730-45 ft., IP: 518 bbl. per day condensate through ⅜-in. choke, gas-condensate ratio 9,850, TP 2,325 psi., shut-in pressure 2,905 psi., no water.

Jackson County: New oil pay Lolita-Deep field—Humble D-3 Four-Way Ranch, I&GN Sur., top pay 7,556 ft., TD 8,020 ft., perf. 7,556-64 ft., IP: 134 bbl. oil per day through ⅛-in. choke, GOR 2,491, TP 2,050 psi., CP 2,770 psi., gravity 44°.

Lavaca County: New gas pool—Union Producing Co. 1-A Wm. Borchers, in Wm. Hosford Sur., 3,055 ft. E-NE of Lavaca River, 20 mi. SE of Yoakum, 2 mi. NW of Jackson-Lavaca county line, TD 11,207 ft., perf. 2,030-40 ft., IP: 5,000,000 cu. ft. gas per day, on open flow (dry gas), shut-in pressure 865 psi., no water.

Lee County: New oil pool, Tanglewood, Humble 2 Geo. D. Vick et al, Bethel Smith 1/3rd Lge., NE portion of county, top sand 6,332 ft. Edwards lime, perf.

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6,332-41 ft., TD 6,345 ft., IP: 10 bbl. oil per day on pump, GOR 2,289, 31.3° gravity, and 4 bbl. salt water per day.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Brazoria County: General Crude 11 Belle H. Wisdom, in A. Darst Lge., 1 mi. W of Damon Mound townsite, dry, TD 4,777 ft.

Calhoun County: Amerada Pet. Corp. B-1 State Tr. 93, in State Tract 93, Matagorda Bay, 4½ mi. N of Port O'Connor, dry, TD 5,729 ft.

Fayette County: Blue Bird Inv. Co. 1 Vinc F. Baca, in E. Savage Lge., 3 mi. SE of La Grange townsite, dry, TD 7,974 ft.

Fort Bend County: J. Brown Cutbirth-H. E. Williams - W. S. Thompson 1 Mason Brisco, in Jno. Foster 2-Lge. and Wm. Andrews Sur., 6 mi. N of Rosenberg, dry, TD 7,647 ft.

Goliad County: Chastain & Eaton 1 Charles Conti, in W. D. Durham Sur., 4 mi. NE of Fannin, dry, TD 4,503 ft.

Gonzales County: Southern Minerals Corp. 1 Geo. Metz, in Ezeliel W. Cullen Sur., 3 mi. SW of Leesville, dry, TD 4,873 ft.

Grimes County: H. M. Harrell, Tr. A-1 J. M. Quinn, in S. F. Austin Lge., 9 mi. SE of Navasota, dry, TD 3,822 ft.

Jackson County: Barnsdall Oil Co. 1 Fred Westhoff, in Thomas Menefee Sur., 5 mi. E-SE of Edna and 4½ mi. S-SW of Ganado, dry, TD 7,030 ft.

Jefferson County: McCarthy O. & G. Corp. 1 J. S. Edwards, T&NO Sur., Sec. 81, 1 mi. W of NW Hamshire production, dry, TD 9,859 ft.

Matagorda County: Phillips Pet. Co. 1 Matagorda, in D. Rawles Sur., 1½ mi. N of W side production at Sugar Valley field, dry, TD 10,512 ft.

Montgomery County: R. C. Paul et al 1 H. M. Crighton, in Wm. S. Allen Sur., 1½ mi. E of West Conroe production, dry, TD 5,029 ft.

Victoria County: Hunt Oil Co. 1 John Rothlisberger, in John D. Wright Sur., 4½ mi. W of Victoria, dry, TD 4,604 ft.

Washington County: Texas Co. 1 Peter G. Byrd, in Susanna Clampitt Sur., A-26, 3 mi. N of Independence townsite and 5 mi. NE of Clay Creek dome, dry, TD 8,502 ft.

EASTERN TEXAS

Kaufman County Test Cores Below Break

DALLAS.—Four miles east of Kemp, in Kaufman County, T. D. Humphrey 1 Tuggle cored 5 ft. of limestone between 6,146-54 ft., bearing odor and stain and bleeding oil from the bottom 6 in., with good porosity and fluorescence. Operators reported a drilling break at 6,139 ft., drilling 4 minutes per foot between 6,140-45 ft. Cuttings indicated limestone, with weak fluorescence, a possible stain but no odor. A drill-stem test of the Upper Glen Rose between packer at 5,580 ft. and 5,625 ft., produced a slight, steady blow throughout and recovered 190 ft. of drilling mud, with salty taste and no shows. Tool was open 75 minutes on the test.

In Shelby County, Humble Oil & Refining Co. 1-C Pickering Lumber Co. plugged back to the Austin at 3,488 ft. to cement a leak in casing, and was waiting on cement before drilling out and ahead toward contract depth of around 9,500 ft. Total depth is 9,017 ft. Humble 1 Kate E. Sackett estate, 1½ miles south of Flint, in Smith County, was drilling below 4,391 ft. Sample top on the Pecan Gap was 3,661-94 ft.

Stanolind Oil & Gas Co. 1 B. F. Weakley, Blackfoot field, Anderson County, was drilling at 9,187 ft. A drill-stem test between 9,108-55 ft., open 1 hour and 15 minutes, had no surface pressure, but built

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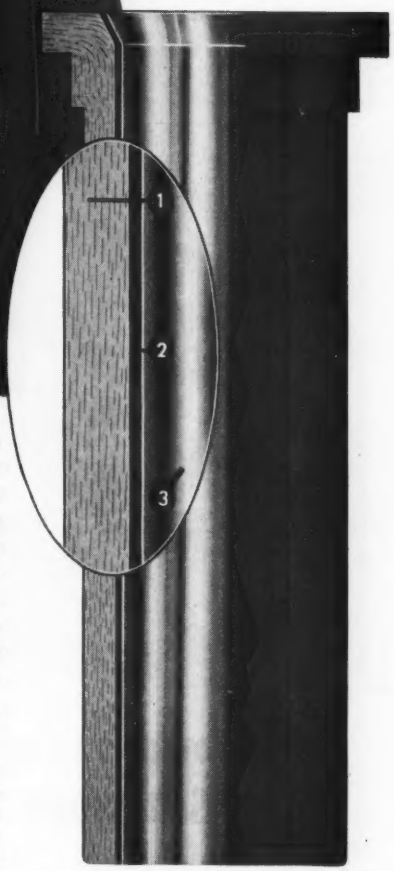

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up to 30 psi. when shut in for 10 minutes. Gas was bled off and burned for 30 minutes. When the tool was pulled, recovery was 2,000 ft. of gas-cut water cushion and 90 ft. of muddy water with gas and light oil shows.

Union Producing Co. 1 Bolton, Angelina County wildcat, 7 miles northeast of Lufkin, in the Vincent Mitchell Survey, blew out, making gas and salt water. Operators killed the flow in 5 hours and were conditioning hole. Total depth is 6,214 ft. With base of the Austin placed at 6,105 ft., it was believed the blowout was in the Woodbine.

Humble's deep Freestone County test, the 1 R. P. McWatters, 1½ miles south of Freestone, was drilling below 12,950 ft., and some observers thought it was in the Buckner. New contract depth is reported to be 14,000 ft. Side-wall cores at 11,164 and 11,195 ft. had no recovery due to the core barrel being lost in the hole. Operators lost a day in freeing stuck drill pipe at 12,936 ft. Sample top on the lower Cotton Valley limestone was placed at 12,615-25 ft.

In Henderson County, W. B. Hinton 1 J. M. Criswell estate, C. M. Walters Survey, in the Athens area, was drilling below 7,685 ft. Samples worked to 7,360 ft. gave the following tops, with no anhydrite reported: Kiamichi shale 6,110-40 ft., Goodland 6,180-6,210 ft., and Paluxy 6,380-6,410 ft. Elevation is 487 ft. In the Jose S. Cordova Survey, J. P. Owens et al 1 DeArmon was drilling below 5,524 ft. in lime and shale. Top on the Comanche shale was 4,780-4,810 ft., and the Comanche lime was 4,810-40 ft., by samples.

In Trinity County, 8 miles north of Trinity, Humble 1 Thompson had total depth at 12,005 ft., and stopped to test Rodessa porosity at 11,975-12,000 ft., as shown by electrical survey. Seven-inch casing is set at 12,232 ft. The well has shown for production in both the Woodbine and Edwards zones.

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OHIO, KENTUCKY

Wayne County Well Boosts Output 91 Bbl.

COLUMBUS.—The Preston Oil 1 Alice M. Kline, Section 19, Congress Township, Wayne County, was shot after producing from the Clinton sand natural since November of last year. The original natural production was 25 bbl. and in 24 hours after shot, flowed 116 bbl.

The Mid East Oil offset an old well in the direction of the new oil pool in Jackson Township, Knox County, and brought in a nice oil and gas well on E. L. McKee, Section 14. Gas gaged 590,000 cu. ft. natural, and an estimated 1,000,000 cu. ft. after shot along with 30 bbl. of oil.

Two small wells were completed in the extreme south end of the Sayre pool, both in Bearfield Township, Perry County. Fred Beasley 2 Lola Coulter, Section 27, gaged 535,000 cu. ft. natural from the Medina sand, and an estimated 800,000 cu. ft. when shut in after shot. The sand was logged at 3,992-99 ft. and the rock was 1,100 lb. One-half mile to the south, the Beasley 2 Katie Brown, Section 34, gaged 180,000 cu. ft. natural from the Medina at 3,897-3,905 ft. This well was tubed without shooting.

In the Sego pool, the Mt. Perry Coal 1 fee, Section 28, Madison Township, Perry County, made 76 bbl. after shot. Clinton sand came in at 3,240-92 ft. and showed 20 bbl. natural. The Mid East 4 Beard flowed 93 bbl. in 24 hours after shot with 750,000 cu. ft. gas.

New locations for the week totaled 20 from 10 counties. Perry continues as one of the most active with 8 and was followed by Washington with 3, and Medina with 2. Lancaster field led in completions with 11 out of a total of 32, 9 of which were in Perry County.

OHIO WILDCAT FAILURE

Belmont County, Somerset Township: Huntsman & Peters 1 Floyd Huntsman, Sec. 10, Berea, TD 1,954 ft.

EASTERN KENTUCKY

ASHLAND.—No completions were noted on the report of activities in the Eastern Kentucky field of operations during the past week.

New locations included Well No. 5,787, Elisha Branham, Pike County, and Well No. 5,818, Thomas Little, Pike County.

WESTERN KENTUCKY

OWENSBORO.—In Henderson County, Carter Oil Co. has completed 1 A. E. Melton, 14-O-23, for an initial production of 196 bbl. per day from the Waltersburg at 1,754-66 ft. Total depth is 2,710 ft.

Miller & Shiarella and Ashland Oil & Refining Co. 2 F. G. Robertson, 13-N-27, McLean County, was completed in the Cypress at 1,922-57 ft. for an initial production of 200 bbl. per day.

Starting date of the important deep test, Fure Oil Co., Ashland Oil & Refining Co., and I. B. Browning 1 M. L. Walker, 22-N-24, Webster County, has been changed and the work is now scheduled to start soon after the middle of this month.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Henderson County: Carter Oil Co. 1 A. E. Melton, SE NW NE 14-O-23, IP 196 bbl., Waltersburg 1,754-66 ft., TD 2,710 ft., plugged back to 1,776 ft.

INDIANA

EVANSVILLE.—Earnest Zink 1 Frances Maier, NW SW SE 12-4s-11w, wildcat in Gibson County, is waiting on cement to test the McClosky after a drill-stem test recovered 150 ft. of oil, 40 ft. of oil-cut mud, and 450 ft. of water. Well is located about halfway between Evansville and Princeton.

A. E. Morrison 1 H. Haper Heirs, NW NW NW 34-1s-10w, Gibson County, pumped at the rate of 24 bbl. per day from the McClosky at 2,027-30 ft.

In Posey County, Ashland Oil & Refining Co., J. Buchman, and C. E. O'Neal 1 E. Stockfleth, SW SW NE 24-5s-12w, has been completed in the Waltersburg, 1,867-74 ft., and the Cypress, 2,351-59 ft. for an initial production of 30 bbl. of oil and 90 bbl. of water per day.

KANSAS

Barber County Wildcat Tests for Good Well

IN the area about 1¼ miles south of the Deerhead pool in Barber County, Lion Oil Co. 1 De Geer, NE NE SW 2-33s-15w, is testing for a good Viola producer. Well flowed 35 bbl. of oil in 1 hour and 85 bbl. in 3 hours through 26/64-in. choke from perforations opposite the Viola at 5,179-83 ft. Operator drilled to a total depth of 5,434 ft. and set casing to 5,343 ft. Perforations at 5,283-85 ft. resulted in 4,000 ft. of water in 30 minutes so the hole was plugged back to 5,225 ft. and perforated opposite the Viola.

Harry Gore has set pipe to 3,453 ft. at 1 Ruder, SW SW NE 14-9s-19w, Rooks County, to test a good show of oil reported in the Arbuckle, topped at 3,455 ft. Total depth is 3,456 ft. This wildcat is located about 1 mile south of the Barry pool.

Donald T. Ingling has set casing at 2,955 ft. at 1 Griffith, SW SW SW 33-19s-1w, McPherson County, to test a show in the Mississippian. A 35-minute drill-stem test at 2,955-71 ft. had gas in 5 minutes and recovered 90 ft. of gas-cut mud.

In Barton County about 5 miles southeast of the Everleigh pool, Raymond Geer 1 Everleigh, SE SW NE 22-18s-13w, was showing for about 48 bbl. per day from the Arbuckle. Casing was set at 3,311 ft., 2 ft. below the top of the Arbuckle, and drilled in to a total depth of 3,348 ft. Water was found at this depth and the well was plugged back to 3,320 ft. and treated with acid.

J. P. Gaty 1 Phillips, NE NW SE 8-26s-2e, Sedgwick County, has been completed with a depthograph potential of 1,173 bbl. per day from the Mississippian. Well is located about 7 miles northeast of Wichita and 2 miles northwest of the Greenwich pool.

Phillips Petroleum Co. had an excellent oil recovery on a drill-stem test at 1 Stafford, NW NW SW 33-21s-13w, Stafford County, offset to last month's pool opener. The Lansing was topped at 3,372 ft. and the recovery from a 40-minute drill-stem test at 3,441-61 ft. was 1,844 ft. of clean oil. The well is being drilled to the Arbuckle, the pay zone of the pool opener.

For the week, a total of 72 new locations were announced. Barton County led with 13, followed by Butler and Russell with 8 each.

KANSAS SUCCESSFUL WILDCAT

Sedgwick County: J. P. Gaty 1 Phillips, NE NW SE 8-26s-2e, produced 1,173 bbl. of 40°-gravity oil per day, initial potential, from Mississippian at 2,960-61 ft.; Lansing 2,489 ft., TD 2,961 ft.

KANSAS WILDCAT FAILURES

Butler County: Shell Oil Co. 1 Matlock, NE NW SW 26-25s-6e, dry, TD 2,745 ft.

W. L. Hartman 1 Swindell, NW NW NW 19-26s-4e, dry, TD 3,074 ft., Lansing 1½880 ft., Kansas City 2,245 ft., Mississippian 2,702 ft., Viola 3,032 ft., Simpson 3,065 ft.

Cowley County: Andy Krow 1 Schonkoff, SW NE NW 33°31s-5e, dry, TD 2,465 ft., Stalnaker sand 1,995 ft., Layton 2,308 ft. with show of oil, Kansas City 2,421 ft.

Ellis County: Darby & Bothwell 1 Giebler, SE SE SE 10-13s-17w, dry, TD 3,580 ft., anhydrite 1,165 ft., Topeka 2,964 ft., Heebner 3,210 ft., Dodge 3,232 ft., Lansing 3,253 ft., Marmaton 3,452 ft., conglomerate 3,525 ft., Arbuckle 3,530 ft.

Skelly Oil Co. 1 Leiker, SW SW NE 11-14s-18w, dry, TD 3,630 ft., anhydrite 1,180 ft., Heebner 3,217 ft., Dodge 3,238 ft., Lansing 3,261 ft., conglomerate 3,519 ft., Arbuckle 3,580 ft. with very slight stain of oil.

McPherson County: Lotus Oil Co. 1 Sinden, NW NW NE 15-20s-3w, dry, TD 3,092 ft., Mississippi lime 3,026 ft. with show of oil.

Marion County: Wilson et al 1 Koslowski, SE NW NW 8-21s-4e, dry, TD 2,260 ft., Bartlesville sand 2,255 ft.

Pratt County: Mid-Continent Petroleum 1 Polman, SE SE NW 22-26s-13w, dry, TD 4,636 ft., Lansing 3,802 ft., Viola 4,441 ft., Arbuckle 4,588 ft.

Rush County: D. R. Lauck 1 Conrad, NW NW NE 36-19s-18w, dry, TD 4,098 ft., anhydrite 1,303 ft., Heebner 3,583 ft., Lansing 3,635 ft., Arbuckle 4,023 ft., no shows.

Sedgwick County: Carlock & McGinn 1 Clark, NW NW NE 23-25s-1w, dry, TD 2,750 ft., Lansing 2,367 ft., Kansas City 2,697 ft.

Stafford County: Tom Allen 1 Melone, NE NE NE 23-22s-11w, dry, TD 3,648 ft., Kansas City 3,183 ft., conglomerate 3,491 ft., Viola 3,517 ft., Simpson 3,598 ft.

McCole & Sproat 1 Fitzmeyer, SW SW SW 33-22s-11w, dry, TD 3,729 ft., anhydrite 512 ft., Topeka 2,714 ft., Hunton 3,097 ft., Lansing 3,266 ft., conglomerate 3,578 ft., Viola 3,601 ft., Simpson 3,622 ft., Simpson sand 3,632 ft., Arbuckle 3,689 ft.

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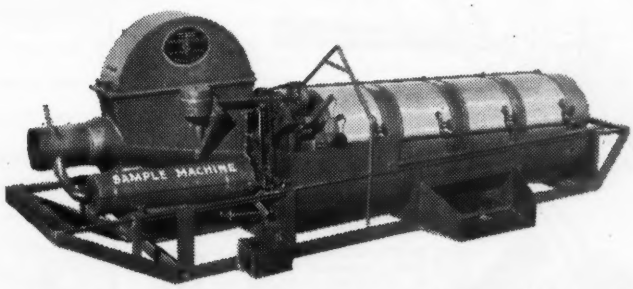

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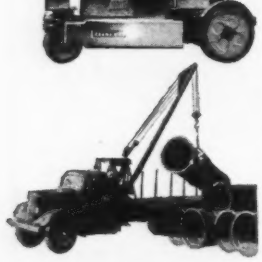

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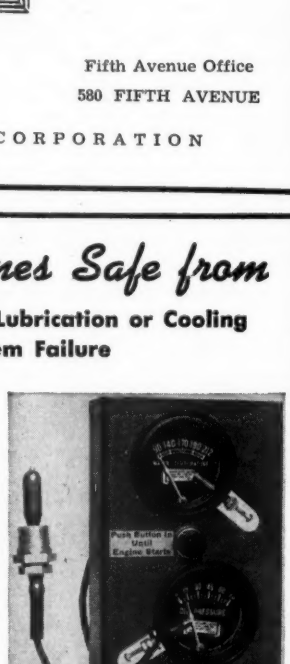

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PERMIAN BASIN

Ellenburger Discovery Possible Near Iolanthe

MIDLAND.—Sterling County exploratory work was again holding interest, with an Ellenburger discovery in prospect 5 miles northeast of Iolanthe, at Humble Oil & Refining Co. 1-B I. L. Ellwood, Section 56, Block 18, SP Survey. The Ellenburger was topped at 7,960 ft. and drilled to 7,980 ft. A 45-minute drill-stem test brought gas to the surface in 6 minutes, estimated at 4,000,000 cu. ft. daily, and recovered 2,900 ft. of 47.1°-gravity oil, plus 450 ft. of heavily onl and gas-cut mud. Shut-in bottom-hole pressure rose to 2,950 psi. in 10 minutes. Operators were to drill another 20 ft. and test.

Plymouth Oil Co. staked location for a 5,000-ft. Wichita Albany wildcat 13 miles northwest of Sterling City. Location is NE NE Section 42, Block 2, H&TC Survey, and about 3 miles west of the same company's 1 Frost, which was dry in the Ellenburger at 8,364 ft., and last reported planning to test higher in the hole.

Previous reports on Hunt Oil Co. et al 1 Allison, southeast Edwards County wildcat, indicating pay in the Ellenburger at 4,686-4,4,715 ft., were in error. Last report on this test placed top of the Ellenburger at 5,424 ft. A drill-stem test from 5,541-5,623 ft., open 1 hour, produced a fair blow of air for 40 minutes, then died, and recovered 65 ft. of drilling mud, with no shows of oil, gas or water. Drilling continued below 5,660 ft. in lime and shale.

In Culberson County, 25 miles northwest of Toyah, Gulf Oil Corp. 1 M. A. and T. F. Grisham was drilling ahead after recovering salty sulfur water on two drill-stem tests, in unidentified formations. A 1-hour test from 10,370-435 ft. recovered over 10,000 ft. of sulfur water and 300 ft. of mud. The second test, open 90 minutes, from 10,435-510 ft., produced a good blow of air throughout, and recovered about the same amount of sulfur water. There were no shows. Planned depth is 12,500 ft., from the old total depth of 7,005 ft. drilled by Standard Oil Co. of Texas in 1944.

In Pecos County, Humble Oil & Refining Co. 1 Alma D. Unsicker, Section 15, Block 10, H&GN Survey, 2 miles southwest of Pecos Valley, recovered 400 ft. of gas-cut mud, 650 ft. of 43.2°-gravity oil, 350 ft. of oil and gas-cut mud, and 300 ft. of salty sulfur water, on a drill-stem test from 5,648-85 ft. The section tested was not identified other than as Permian. It was drilling deeper.

The Texas Co. et al 1 Sam C. Jenkins, southern Gaines County wildcat 5½ miles west of Doss field, Section 4, Block A-25, PSL Survey, found oil in the Devonian at 9,120-40 ft. A 3-hour test of that interval produced a strong blow of air, decreasing toward the end of the test, and recovered 400 ft. of heavy, low-gravity oil, plus 90 ft. of oil-cut drilling mud. Operators drilled to 9,202 ft. and were to make another test with packer at 9,140 ft. On an elevation of 3,418 ft., top of the Devonian was placed at 9,116 ft., which was said to be some 800 ft. high to Shell Oil Co., Inc., 1 T. K. Sparks, 10,604-ft. dry hole in Section 3, Block A-13, 2½ miles to the northeast.

New locations for the week totaled 63, including 4 wildcats, compared with 69 field and 8 wildcat locations the previous week. Andrews, Hockley, Mitchell and Runnels counties received the new wildcats, while field well locations were: Hockley 17; Andrews and Pecos 9 each; Crane, Ector, Gaines, Hale and Howard, 3 each; Crockett 2, and Coke, Dawson, Lamb, Reeves, Scurry, Sterling and Winkler 1 each.

Completions for the week totaled 72, being 63 oil wells, 1 gas and 8 dry. Included in this total were 2 oil discoveries, 1 gas discovery and 5 wildcat failures.

WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Pecos County: Humble Oil & Refining Co. 1 Fred Turner, Jr., Sec. 18, Blk. 119, GC&SF Sur., 8 mi. NW Fort Stockton, pumped 39 bbl. oil a day, show oil sand 2,870-3,000 ft., TD 3,010 ft., elev. 2,833 ft.

LaGloria Corp. 1 H. L. Winfield, Sec. 10, Blk. 132, T&St. L. Sur., 9 mi. SE Fort Stockton, estimated 200,000 cu. ft. gas a day potential, flowed 1,000,000 cu. ft. gas a day with light spray of oil after shot between 3,955-85 ft., TD 4,032 ft., top Clear Fork 3,948 ft., elev. 3,044 ft.

Sterling County: Anderson-Prichard Oil Corp. 1 Marvin F. Foster, Sec. 12, Blk. 15, H&TC Sur., 7 mi. S Sterling City, flowed 846 bbl. 26.5°-gravity oil a day, ¾-in. choke, Wichita Albany topped 3,210 ft., top pay 4,252 ft., perforated 4,252-4,305 ft., TD 8,230 ft., PB 4,406 ft., elev. 2,479 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

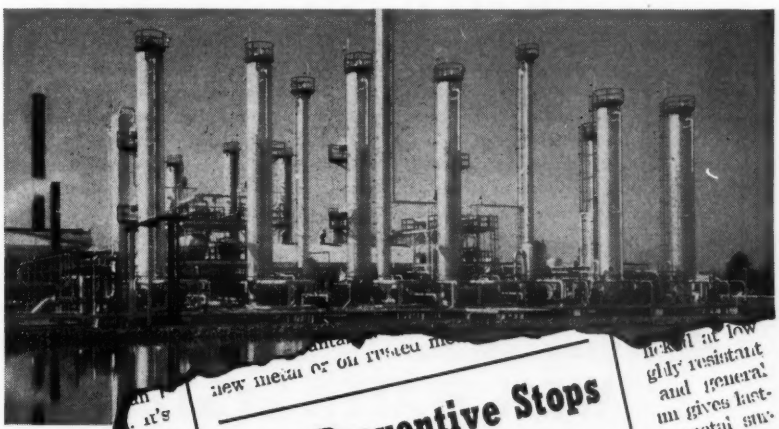
Crockett County: J. I. Moore 1 J. S. Todd estate, Sec. 15, Blk. YZ, ELRR Sur., 2 mi. SE Shannon field, dry, TD 2,514 ft., show oil 2,186, 2,243, 2,277 ft., swabbed dry after acid treatment.

Gaines County: Atlantic Refining Co. 1 G. H. McDonald, Sec. 128, Blk. G, WTRR Sur., 3 mi. E Seminole field, dry, TD 5,500 ft., anhydrite 2,000 ft., Yates 3,350 ft., elev. 3,262 ft.

White Eagle Oil Co. 1 Alma Waters, Sec. 8, Blk. C-32, PSL Sur., 10 mi. E Seagraves, dry, TD 5,445 ft., brown lime 4,310 ft., San Andres 4,895 ft., elev. 3,265 ft., no shows reported.

Runnels County: West Central Drilling Co. et al 1 M. McGill, Sec. 330, F. J. Ford Sur., 2½ mi. SE Winters, dry, TD 4,752 ft., odor of oil 2,984-98 ft., Ellenburger 4,598 ft., elev. 1,816 ft.

Scurry County: Paul F. Lawliss 1 Fred Bowers, Sec. 27, Blk. 3, H&GN Sur., 7½ mi. E of SE end of Sharon Ridge



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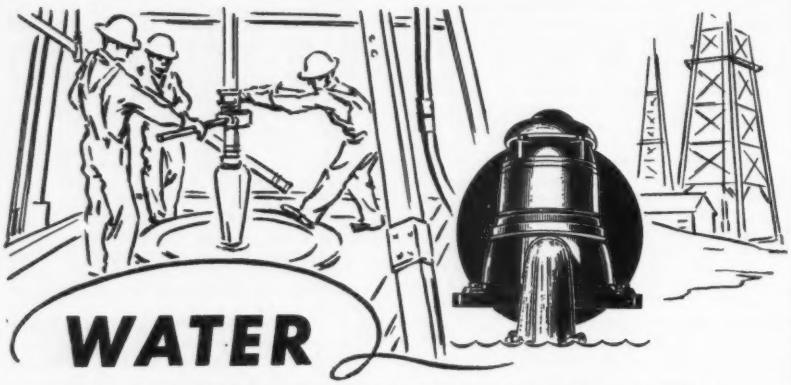

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field, dry, TD 3,665 ft., Glorietta 2,140 ft., elev. 2,345 ft.

Winkler County: Stanolind Oil & Gas Co. 2 Seth Campbell, Sec. 13, Blk. B-5, PSL Sur., 4 mi. N Halley Station, dry, TD 11,905 ft., Glorietta 5,110 ft., Tubb 6,060 ft., Mississippi 8,360 ft., Woodford shale 8,900 ft., Devonian 9,460 ft., Fusselman 9,915 ft., Ellenburger 11,830 ft., elev. 2,860 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Rig was being torn down at Mid-Continent Petroleum Corp 1-A U. D. Sawyer, northeastern Lea County discovery, 6 miles east of Crossroads, in 27-9s-36e. Completion tests through casing perforations from 12,115-215 ft. produced 170 bbl. of 42.6°-gravity oil the first hour through ¾-in. tubing choke, and 110 bbl. the second hour through ½-in. opening. On ¼-in. choke, it flowed 150 bbl. of oil in 1 hour. Shakeout tests showed sediment had decreased to less than 1 per cent. The discovery has been designated as Crossroads pool by the New Mexico Conservation Commission.

Skelly Oil Co. staked location for its 1 U. D. Sawyer in NE NE 33-9s-36e, as a southwest offset to the discovery. Northeast of Mid-Continent's well, Magnolia Petroleum Co. made location for a test in SW NW 26-9s-36e.

Other New Mexico wildcats holding interest are Texas Pacific Coal & Oil Co. 39-A-2 State, 9-22s-36e, pre-Permian test in the shallow South Eunice field, which was drilling below 8,318 ft., and Amerada Petroleum Corp. 2 H. S. Record, 25-19s-35e, drilling below 13,364 ft. in lime.

Magnolia Petroleum Co. 1-X State, 7-17s-34e, extended San Andres production from the Vacuum field, when it completed for 111 bbl. of oil a day from pay at 4,660-74 ft.

In northwest Eddy County, Southern Union Production Co. 1 Elliott, 24-18s-23e, was drilling below 9,887 ft., in an unidentified formation.

In east central Chaves County, Richfield Oil Corp. staked location for a 2,500-ft. rotary test as the 4-1 J. P. White, SW SW 31-10s-28e.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: Ralph A. Shugart 1 Shugart-Superior, NE SW NW 26-21s-25e, dry, TD 3,369 ft. in sand and shale, Cherry Canyon 1,845 ft., Brushy Canyon 2,932 ft., elev. 3,495 ft.

Eddy County: Ralph A. Shugart 1 Shugart-Superior, NE SW NW 26-21s-25e, dry, TD 3,369 ft. in sand and shale, Cherry Canyon 1,845 ft., Brushy Canyon 2,932 ft., elev. 3,495 ft.

MICHIGAN

Wildcat Making 100 Bbl. Daily in Weare Township

SAGINAW.—A western Michigan wildcat producer was under test in the past week as 14 other wells were completed and nine new locations were announced. Ajax Drilling Co. reported production was 100 bbl. a day from the No. 1 McMillan wildcat on a lease owned by C. L. McGuire, Inc., 3 miles north of Pentwater in Weare Township, Oceana County. Production was from the Dundee at 2,092 ft.

Of the completions, three were oil producers, three were gas wells, the rest dry holes, including three wildcats. One wildcat in Port Huron Township, St. Clair County, was producing, but only at 3 bbl. a day.

The three gas wells are Michigan Gas Storage Co. facility wells in Summerfield Township, Clare County. The completions were widely scattered, being recorded in 11 counties. Best of the three oil producers was the C. W. Collin 1 Peters in Jerome Township, Midland County, producing 5 bbl. an hour.

Five of the nine new locations are in Allegan County, one each in Bay, Clare, Crawford and Montcalm.

The State Conservation Department announced an indefinite postponement of a state land oil and gas leases auction which had been set for June 4 because of a re-examination of the checkerboard leasing policy. Monetary considerations are behind the action, the commission estimating that its program cost the state $300,000 in 15 years. The leasing pattern has been to withhold rights on certain acreage in the hopes that oil and gas discoveries would bring larger bonuses.

MICHIGAN SUCCESSFUL WILDCAT

St. Clair County, Port Huron Township: William J. Morriss 1 Ida May, NW SE SE 32-7n-17e, 3 bbl. per day, acidized, in Dundee, TD 601 ft.

MICHIGAN WILDCAT FAILURES

Gratiot County, Newark Township: Ohio Oil Co. 1 John A. Prichard, SW SW SE 36-10n-3w, dry in Dundee, TD 3,144 ft.

Kalamazoo County, Oshtemo Township: Beeker and Cady 1 McKinney, SW SE SW 5-2s-12w, dry in Traverse, TD 1,377 ft.

Muskegon County, Cosnovia Township: Red Oil & Gas Co. 1 Clinton Lundquist, SE NW NE 35-10n-13w, dry in Antrim dolomite, TD 1,550 ft.

OKLAHOMA

Northwest Perry Gets Extension in Wilcox

CARTER OIL CO. has extended Northwest Perry pool in Noble County at 1 Vertz, SE NW SW 8-21n-1w, by production from what appears to be a deeper pay in the Wilcox. Casing has been set after a drill-stem test at 5,195-5,210 ft. had oil flowing at the rate of 25 bbl. per hour. An early test at 5,094-5,107 ft. recovered gas-cut mud. The First Wilcox, topped at 5,174 ft., was checked by cores and a drill-stem test at 5,170-89 ft. recovered gas-cut mud. Total depth is 5,210 ft. The pool was opened in September 1947 by production from Sandy Dolomite, 5,166-76 ft., and First Wilcox, 5,176-78 ft., at Warren Oil Corp. 1 Ruby Burgess, NE SE NW 8-21n-1w.

In the area about 2½ miles northeast of the Northwest Perry pool, Warren Oil Corp. has announced location for a wildcat test at 1 Harry Briscoe, SE SW SW 35-22n-1w.

The development at the north end of the Sholem Alechem field, Stephens County, appears to be adding valuable reserves to the Springer sand pay. At the northwest extension, Magnolia Petroleum Co. has drilled and tested 200 ft. of pay at 1 Turner, SW SE NE 34-1n-4w, and is drilling ahead at 5,461 ft. A 1-hour drill-stem test at 5,333-59 ft. recovered 1,180 ft. of oil. Between Magnolia's extension and the pool proper, Amerada Petroleum Corp. 2 Calmes, NE SW SE 34-1n-4w, pumped 177 bbl. in 18 hours from perforations at 5,204-5,300 ft. and 5,160-90 ft. About ¾ mile to the east of the Amerada well, Stanolind Oil & Gas Co. 1 Moss, NE SE SW 35-1n-4w, pumped 252 bbl. in 24 hours from the pay through perforations at 5,200-5,325 ft.

In Garvin County, Superior Oil Co. 1 I. L. McDaniel, C NW SW 15-4n-4w, on a drill-stem test at 12,428-549 ft. with a 4,500-ft. water load and tool open for 1½ hours recovered 125 ft. of fluid, 1,000 ft. of frothy, gassy mud, and 1,500 ft. of muddy salt water. The well had heavily oil-cut mud on drill-stem test at 8,130-60 ft. in the Pennsylvanian and cored sand, bleeding oil, at 8,163-78 ft. Operator will swab down and test.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Cities Service 1 Rogers "B," SW NE SE 25-4n-4w, flowed 203 bbl. of 43.4°-gravity oil per day from Deese sand at 7,975-8,020 ft., through ⅜-in. tubing choke, TD 12,598 ft.

Logan County: E. Evansville pool opener—Jordan 1 Faver, SE SE SE 8-15n-1e, flowed 102 bbl. of 43°-gravity oil per day from Bartlesville at 5,008-18 ft., TD.

Seminole County: Bishop 1 Whitney, SW NW NE 14-6n-6e, pumped 10 bbl. of 36°-gravity oil per day from Earlsboro at 2,346-55 ft., TD 2,405 ft.

OKLAHOMA WILDCAT FAILURES

Blaine County: Stanolind 1 Wildman, NW NE NE 19-19n-11w, dry, TD 10,017 ft.

Cleveland County: Ohio 1 Anderson, C SE SE 19-7n-1w, dry, TD 7,233 ft., Haragan 7,000 ft., Chimney Hill 7,110 ft., Sylvan 7,200 ft.

Garvin County: Carter 1 Carlton, SE NW NW 8-2n-1w, dry, TD 5,550 ft., Hogshooter 4,896 ft., second Checkerboard 5,156 ft., Deese 5,170 ft., first Deese sand 5,239 ft., second Deese sand 5,305 ft., detrital 5,414 ft., Sylvan 5,442 ft.

Phillips 1 Street, C NE SE 5-3n-3w, dry, TD 10,002 ft.

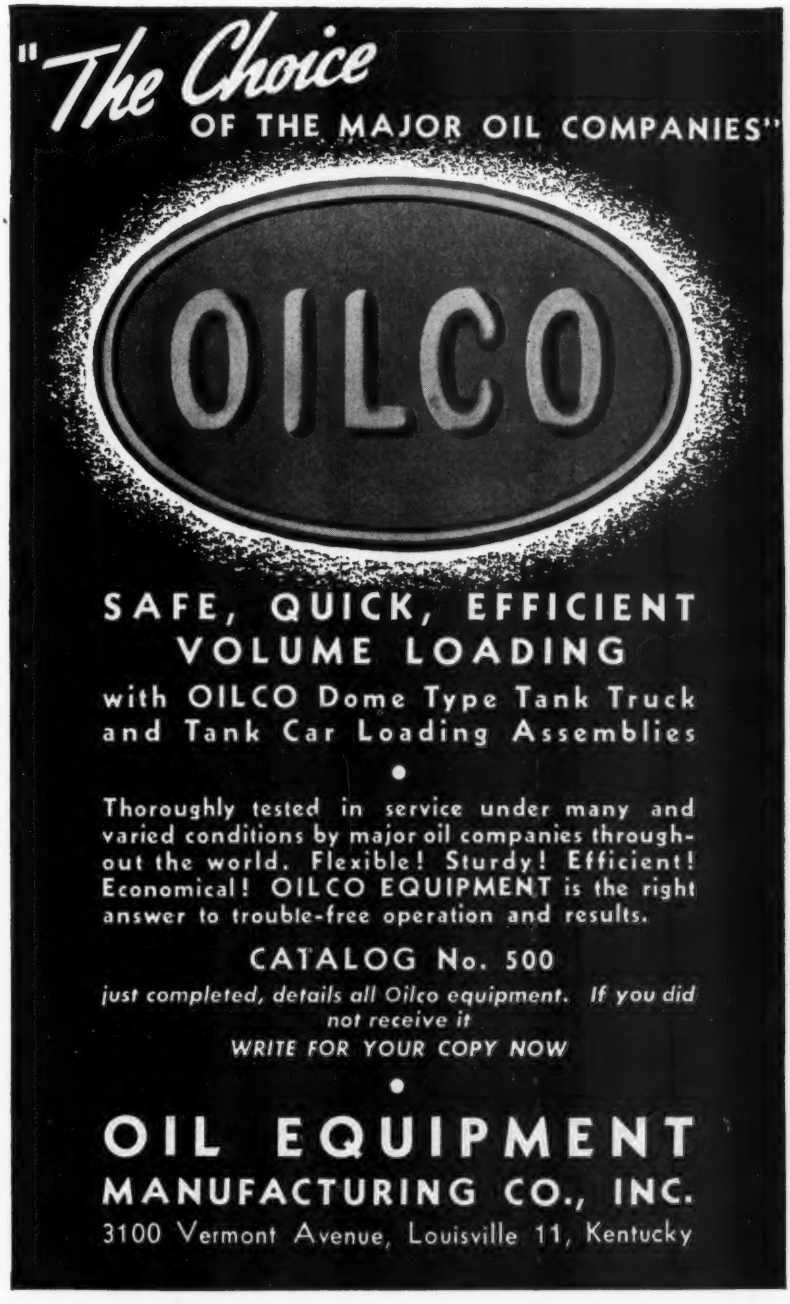
Carey 1 Gillis, SE SE NE 15-3n-2e, dry, TD 3,511 ft., upper Belle City 2,528-44 ft., lower Belle City 2,578-2,600 ft., Hogshooter 2,684-95 ft., Burns and Brundage 2,778 ft., McLish 3,292 ft.

Hughes County: Hall 1 Ramsey, SW SE NE 11-7n-10e, dry, TD 2,573 ft., lime 2,290 ft., Booch 2,516 ft., Booch sand 2,552 ft.

Kingwood 1 Meyers, NW SW SW 12-7n-10e, dry, TD 2,600 ft., coal 2,522 ft., lower Booch 2,523 ft.

Jefferson County: Ross 1 Smart, NW SE NW 25-7s-6w, dry, TD 2,000 ft.

Lincoln County: Fleet 1 Moore, C SE SE 21-17n-2e, dry, TD 4,898 ft., Avant 2,600 ft., Checkerboard 3,540 ft., Prue 4,113 ft., Red Fork 4,325-60 ft., Mississippi lime 4,435 ft., Woodford 4,494 ft., Hunton 4,529 ft., Sylvan 4,610 ft., Viola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4,705 ft., dense 4,740 ft., Wilcox 4,780 ft.

Love County: Standard 1 Moore, C NE NE 10-8s-1w, dry, TD 7,560 ft., Home Creek 2,748 ft., Ranger lime 3,303 ft., Twin lime 3,675 ft., Palo Pinto 3,902 ft., KMA lime 4,563 ft., sand 5,818-63 ft., Rocky Point lime 6,450 ft., shale 6,897 ft., Allen sand 6,951-70 ft., first Ranger sand 7,103-20 ft., second Ranger sand 7,180-7,200 ft., Strawn 7,240 ft.

McClain County: Danciger 1 Dean, NE SE SE 31-9n-3w, dry, TD 9,312 ft., Oread 5,130 ft., Belle City 5,490 ft., Hogshooter 6,250 ft., upper Checkerboard 6,775 ft., Wewoka lime 7,070 ft., first oolitic 7,100 ft., second oolitic 7,365 ft., Verdigris lime 8,040 ft., Mayes 8,650 ft., Woodford 8,750 ft., Bois d'Arc-Hunton 8,884 ft., Haragan-Hunton 8,940 ft., Chimney Hill 9,202 ft., Sylvan 9,272 ft.

Noble County: Berkey 1 Swartz, NE NE NW 12-22n-2w, dry, TD 5,251 ft., Woodford 5,085 ft., Simpson 5,130 ft., Wilcox 5,169 ft., second Wilcox 5,232 ft.

Osage County: Neal 1 Osage, SW NE SW 33-27n-11e, dry, TD 1,876 ft., Big lime 1,195 ft., Oswego 1,379 ft., Mississippi lime 1,873 ft.

Pontotoc County: Wilcox 1 Hamilton, NE NE NW 1-3n-8e, dry, TD 3,870 ft., Wapanucka 3,507 ft., Cromwell 3,807 ft.

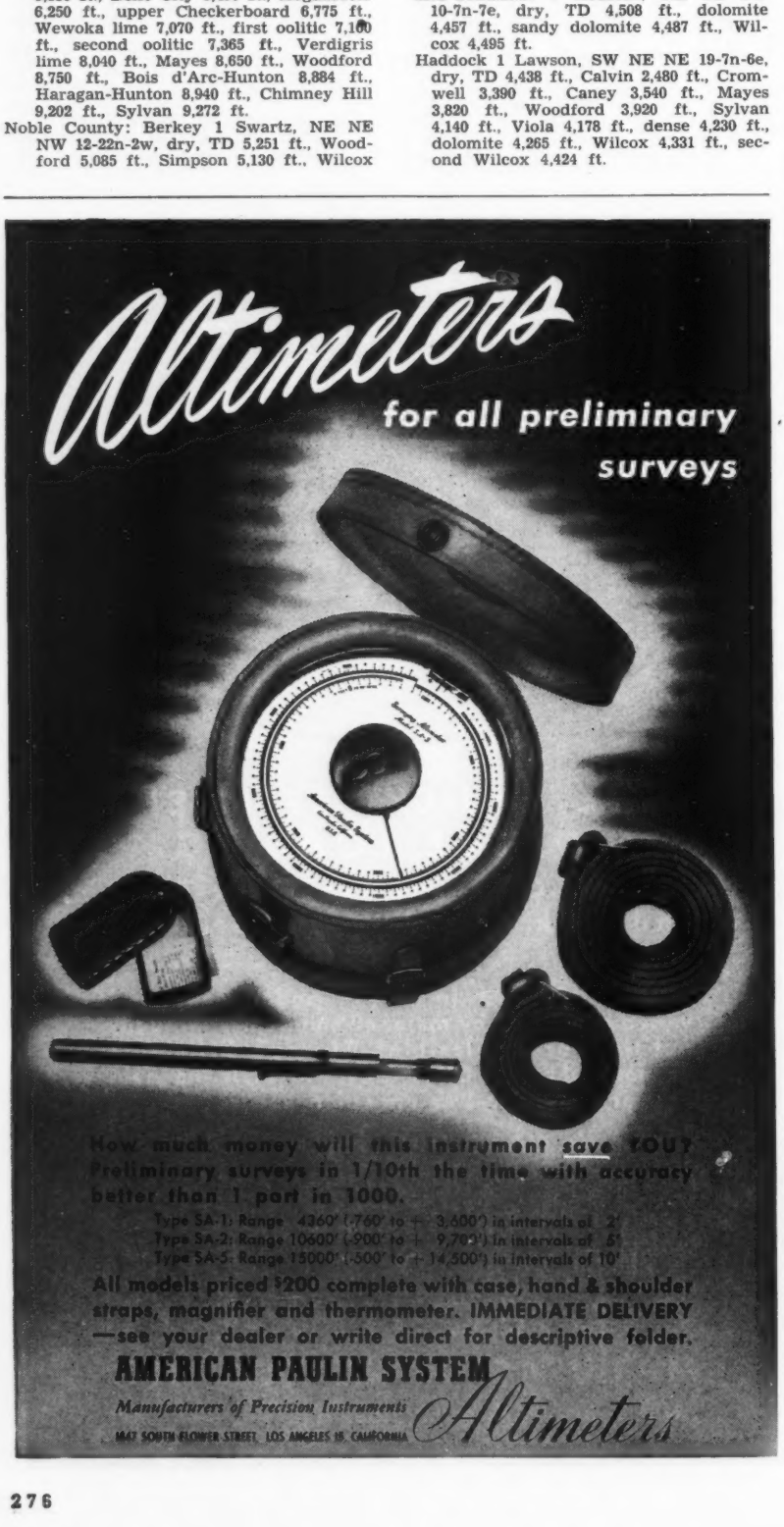
Seminole County: Hall 1 Harris Foundation A, NW SW SE 4-9n-7e, dry, TD 3,665 ft., Gilcrease 3,601-21 ft., Union Valley 3,655 ft.

Mid-Continent 1 Houston, NE SE SW 10-7n-7e, dry, TD 4,508 ft., dolomite 4,457 ft., sandy dolomite 4,487 ft., Wilcox 4,495 ft.

Haddock 1 Lawson, SW NE NE 19-7n-6e, dry, TD 4,438 ft., Calvin 2,480 ft., Cromwell 3,390 ft., Caney 3,540 ft., Mayes 3,820 ft., Woodford 3,920 ft., Sylvan 4,140 ft., Viola 4,178 ft., dense 4,230 ft., dolomite 4,265 ft., Wilcox 4,331 ft., second Wilcox 4,424 ft.

Stephens County: Carter 1 Voorhees, NW NE SW 4-1s-5w, dry, TD 8,000 ft.

Champlin 1 Wilkerson, SE NE SE 17-1s-5w, dry, TD 8,780 ft.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ROCKY MOUNTAIN

Buck Creek Field Test Gets Oil at 5,773 ft.

DENVER.—Oil was recovered on drill-stem test of the Leo (Minnelusa) by Continental Oil Co. in the first deep test of Little Buck Creek field, Niobrara County, Wyoming. The well, which is 12 ELCU "B," NW NE SE 36-36n-64w, topped the Leo at 5,755 ft. and on drill-stem test 5,751-5,773 ft. recovered 1,400 ft. of oil and an estimated 500,000 cu. ft. of gas in 10 minutes. The operator continued coring saturated Leo sand to 5,800 ft. and on drill-stem test at 5,785-5,820 ft. recovered 1,300 ft. of water with a scum of oil in 45 minutes. Drilling will be continued to test other Pennsylvanian sands prior to completion of the well. The Leo formation is productive in Lance Creek field, 8 miles west of Little Buck Creek. Oil was discovered at Little Buck Creek in 1944 and Continental now has 14 wells producing 1,500 bbl. of oil daily from the Dakota formation in this field. Sundance in the present test carried water.

Entrance of a new oil operator into the Rocky Mountain region was indicated last week with the announcement that Wilshire Oil Co. of Los Angeles is now preparing to make location for a wildcat test of the North Rawhide structure, Park County, Wyoming. The block was acquired 3 years ago by Cities Service Oil Co., who is now unitizing the 6,000-acre structure. North Rawhide is in Township 49n-102w, northwest of Pitchfork field. The test is reportedly scheduled to Madison and will be the first operation of Wilshire in the Rocky Mountains.

Carter Oil Co. is abandoning the Madden wildcat at 1 Shoshone-Madden, C NE NW 30-7n-1e (WRM), Fremont County, Wyoming, after finding water in the Madison. The well was drilled to 1,270 ft., total depth, and on test between 1,235-1,270 ft. recovered 875 ft. of water and water-cut mud. Shows of oil were found in the Phosphoria but these were not commercial.

Tests have not been made of The Texas Co.'s second Adon well in the central section of the Powder River basin, Wyoming. The well is 2 Unit, NE NW NW 2-52n-72w, ½ mile west of the discovery, and top of the Minnelusa was logged at 8,806 ft. Structurally the well is 28 ft. higher on the Minnelusa than the discovery well, which was completed pumping 250 bbl. of oil daily from the upper Minnelusa section. At 8,828 ft., total depth, the operator is now making drill-stem test of the Minnelusa and may complete the well at the present depth. The discovery well in this field started a heavy leasing play throughout the Powder River basin of Wyoming and Montana, and a number of geophysical crews are now working in this area.

It is reported from Bismarck, N. D., that recent leasing activity by Rocky Mountain brokers in the state indicates a revival of the extensive play carried on 8 years ago by a number of the major operators. According to the report blocks of leases exceeding 100,000 acres have been acquired in the Nesson area, McKenzie County, in the northwestern part of the state, and Stanolind Oil & Gas Co. and Carter Oil Co. have acquired acreage in McLean County, north of Bismarck. In 1938 California Co. drilled a dry hole at 1 Kemp, C NW NE 3-154n-96w, Williams County, on the north end of the Nesson anticline. The well was drilled to 10,281 ft., total depth, where it was abandoned with stuck drill pipe in the hole. In 1940 Carter Oil Co. led an active exploratory campaign throughout the Williston basin of North

Dakota and the leasing and exploratory activity ceased after completion of several dry holes. Tom Leach, consulting geologist of Tulsa, was active in the operations in the state at that time.

Pure Oil Co. has still not succeeded in getting a test on the West Poison Spider wildcat, west of Casper in Natrona County, Wyoming. The wells is at 14,303 ft., total depth, with 7-in. casing cemented at 13,791 ft. Four attempts have been made to drill-stem test the well but retainer failed on each test. Saturation was logged in cores belog 14,211 ft. and 36°-gravity oil has been recovered with the mud on the well. This test is the deepest in the Rocky Mountains and as a result of shows encountered an active lease play has extended throughout the eastern section of the Wind River basin.

New operations.—Thirty-four new locations were made, with 16 in Wyoming, 6 in Colorado and 12 in Montana. Several of the new wells will be interesting wildcats, including General Petroleum Corp.'s Leo test in the Van Tassell area, along the Wyoming-Nebraska state line. The well is 45-32-P, NE NE SW 32-30n-60w, Goshen County, Wyoming, on a 20,000-acre block extending into Sioux County, Nebraska. The well is located on a surface high and General Petroleum did seismic work in the area. Leo (Minnelusa-Pennsylvanian) is expected at around 6,000 ft. This is the first wildcat to be drilled in this area since completion of a dry hole in 1936 by Ohio Oil Co. in the Jay-Em area, 15 miles southwest of the new location. Phillips Petroleum Co. is rigging up rotary for another Wyoming wildcat in the South Cole Creek area, Converse County, at Well 1 Unit, SE SW NW 17-44n-76w. The test is scheduled to be drilled to Sundance at around 8,500 ft. General Petroleum, operator of the Cole Creek Unit proper, drilled a dry hole in the South Cole Creek area to the Frontier formation in 1942. In the Mush Creek trend area Sierra Petroleum et al are moving in materials for 1 Kummerle, C NE SE 14-45n-65w, Weston County, Wyoming, and the well will be drilled to Newcastle at around 5,000 ft. This well is 10 miles west of Mush Creek field. Two wildcats are scheduled in Montana, including one by L. W. Roche in the SW NE NE 7-9s-61e, in the Seven Mile area of Carter County, in the extrme southeast corner of the state. There has been very little drilling in this area and the well will be of interest as the first of several stratigraphic trap tests in this county. Cloverleaf Co. has made location for a wildcat test in the SE SE SE 23-11n-24e, Devils Basin structure, Musselshell County. Other locations in the three states were for pool wells.

Completions. — Sixteen wells were completed during the week, for a total daily initial of 3,609 bbl. of oil. Seven of the wells were in Montana, six in Wyoming and three in Colorado. Twenty-four hour gage on the Seaboard Oil Co. wildcat at Silver Tip, Wyo., was 576 bbl. of oil per day with approximately 3,000,000 cu. ft. of gas. The oil is 43.7° gravity and production is from the Phosphoria between 8,496-8,516 ft. The well was drilled to Madison at 9,507 ft., total depth, but both the Madison and Tensleep were hard and tight, with no oil recovery on tests. Last week Seaboard completed the first Frontier sand producer in this field for an initial of 114 bbl. of oil daily through choke. Frontier showed good saturation in the present well. The first Phosphoria producer in the South Steamboat area has been completed for an initial of 441 bbl. of oil in 24 hours. Brinkerhoff Drilling Co. and Sohio Oil Co. drilled this test into the Tensleep, productive in the other wells in this area, but plugged back after finding excellent shows in the Phosphoria zone.

WYOMING SUCCESSFUL WILDCATS

South Steamboat, Fremont County: Brinkerhoff-Sohio 3 Tribal, NW SE NW 9-3n-1w (WRM), 7,076 TD, flowed 441 BOPD, perf. 6,745-53, 6,757-92, Upper Muddy 4,260, Upper Dakota 4,491, Lakota 4,748, Nugget 5,397, Phosphoria 6,628, Tensleep 6,982, elev. 5,641, 7-in. casing 7,069.

Silver Tip, Park County: Seaboard 53-33 NPRR, NW SW NE 33-58n-109w, 9,507 TD, PB 8,558, flowed 576 BOPD, perf. 82 holes 8,596-8,516. Frontier 5,505, Peay 5,915, Muddy 6,679, Dakota sand 7,019, Morrison 7,055, Phosphoria 8,496, Tensleep 8,590, Madison 9,015, elev. 4,483, 7-in. casing 8,590.

ILLINOIS

Eastern Clay County Gets Opener In Rosiclare

MATTOON.—Clay County appears to have opened a new pool opener in the area between East Sailor Springs pool and Passport pool at L. L. Blomgren, W. E. Witt, and J. W. Rudy 1 G. W. LaRue, SW SW NW 16-4n-8e. Operator has set casing to test the Rosiclare lime at 2,985-91 ft. after a drill-stem test recovered 360 ft. of oil and 40 ft. of oil-cut mud with the tool open for 1 hour.

Joe Dunbar appears to have a new area opener at 1 Reping, NW SW NE 8-7n-7e, a little over a mile southwest of the Evers pool in Effingham County. A 1-hour drill-stem test of the Rosiclare lime at 2,652-61 ft. recovered 250 ft. of clean oil, 210 ft. of mud-cut oil, and 60 ft. oil-cut mud.

Arvin Drilling Co. and Aetna Oil Co. 1 A. McDade, SE NW SW 17-4n-9e, Richland County, swabbed 30 bbl. of oil and ½ bbl. of water per day from the Cypress sand at 2,665-81 ft. Pumping equipment is being installed to continue the test. Well is located about 1½ miles southeast of the Passport pool.

Gilliam Drilling Co. 1 J. Walter, NE SE NW 23-1s-13w, Wabash County, is one of the best wells to be completed in the West Mount Carmel pool. Initial production of 620 bbl., flowing, was from the McClosky at 2,563-67 ft.

ILLINOIS WILDCAT FAILURES

Effingham County: National Associated Petroleum Co. 1 C. Killmeyer, NE NW SE 10-8n-6e, dry, TD 2,501 ft.

Jasper County: Joe Reznik 1 O. E. Brooks, NE SW NE 36-7n-9e, dry, TD 2,935 ft.

Clay County: Don Slape 1 E. Sanders, NE NW NW 2-4n-5e, dry, TD 2,675 ft.

Richland County: John Lehwald 1 E. J. Watson, SE SE NE 32-4n-10e, dry, TD 3,079 ft.

Bond County: Superior Oil Co. 1 H. Bingham, NW NW NE 6-4n-3w, dry, TD 2,455 ft.

Two California Companies Seek 12-Mile Pipe Line

Southern California Gas Co. and Southern Counties Gas Co. of California have requested authority from Federal Power Commission to construct a 30-in. lateral pipe line extending from a point near Rivera, Calif., on the existing Texas-California line of El Paso Natural Gas Co., to the vicinity of Pasadena. The proposed line, estimated to cost $1,537,000, would be approximately 12 miles long. Construction would start about July 1 and be completed by November 1.

Facilities in a certain designated area would be owned by both companies, with Southern California Gas Co. having a 75 per cent interest and Southern Counties a 25 per cent interest, while in another area Southern California Gas Co. would hold complete ownership.

LA.-ARK.

Bienville Wildcat Resumes Operations

SHREVEPORT. — In Bienville Parish, Barnsdall Oil Co. 1 Davis Bros., wildcat operation in 7-16n-4w, had work under way again after freeing stuck drill pipe. Electric log was run to 10,228 ft.

Delta Drilling Co. 1 Davis Bros., 26-16n-3w, Jackson Parish, was drilling below 7,485 ft. in shale and lime. Cores from 7,236-43 ft. recovered 3 ft. of light gray to tan lime having slight porosity, salty taste and spotted fluorescence. On an elevation of 315 ft., sample top on the Pettit was 7,231 ft.

Tensas Parish exploratory work included C. H. Osmond 1 Wilkerson, 15-12n-12e, drilling below 6,030 ft. in shale. Cores in the Wilcox at 3,190-3,309 ft. had no shows. J. D. Trimble and E. P. Watts 1 Trimble et al, 37-14n-12e, was drilling in sandy shale at 6,963 ft.

Pan American Production Co. 1 Albritton, 10-19n-1e, Union Parish, reported a gas sand at 7,382-96 ft., but apparently did not stop to test. It was drilling ahead below 7,942 ft. in sand. Cotton Valley top was placed at 7,560 ft., with black shale at 7,640 ft. Elevation is 214 ft.

In Webster Parish, Stanolind Oil & Gas Co. and Continental Oil Co. 1 V. Mitchell, 31-23n-9w, had total depth at 2,997 ft. A drill-stem test was to be run after coring spotted stains from 2,604-15, 2,987-92 ft., and oil saturation from 2,992-97 ft.

In the east central portion of the Richland gas area, Richland Parish, J. K. Wadley 1 W. C. Chennault was being watched with interest, but no official information has been released. Approximate formation tops were reported to be: Wilcox 1,160 ft., Midway 1,850 ft., Tuscaloosa 2,345 ft., Lower Cretaceous 2,672 ft., Pine Island 3,455 ft., Pettit porosity 3,770-3,820 ft., and Travis Peak 4,020 ft. Elevation is 82 ft.

NORTH LOUISIANA SUCCESSFUL WILDCAT

DeSoto Parish: The Texas Co. 1 J. J. Rambin, SE NW 23-11n-11w, TD 8,882 ft., PB 5,035 ft., perf. 4,972-96 ft., flowed 245,000 cu. ft. gas, 3/16-in. choke, tubing pressure 390 psi., Rodessa pay.

NORTH LOUISIANA WILDCAT FAILURES

Red River Parish: Allied Oil Co. 1 Yearwood Bros., NW NE SW 7-14n-11w, dry, TD 3,604 ft.

Sabine Parish: Arkansas Fuel Oil Co. 1 Bowman-Hicks, SW SW 3-7n-12w, dry, TD 6,717 ft., base Rodessa 6,555 ft., elev. 326 ft.

Webster Parish: E. V. Whitewell 1 R. C. & A. G. Davis, SE SE SW 24-22n-10w, dry, TD 2,734 ft.

Lone Star Will Continue Texas Eastern Gas Sales

The Federal Power Commission has informed Lone Star Gas Co., Dallas, that it will not assert jurisdiction over the sales of the company to Texas Eastern Transmission Corp. until facilities authorized for construction by United Gas Pipe Line Co. are in operation, but not beyond December 31.

United has been authorized to construct and operate about 9 miles of 10-in. natural-gas transmission line extending from the gasoline plant of Lone Star Producing Co. in Carthage field in Texas to a point of connection with United's Carthage-Longview 20-in. line near Beckville, Tex.

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 15, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1948				
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	32	16	0	*16	37,461	595	469	0	0	0	0	0	0	0	0	0	0
Pennsylvania	48	22	4	†22	107,260	1,033	1,129	0	0	2	0	2	0	0	9	13	22
West Virginia	13	5	5	3	35,164	270	287	1	0	0	1	2	3	0	19	26	48
Ohio	32	10	8	‡14	77,254	475	461	0	0	0	1	1	1	0	7	13	21
Indiana	14	4	1	9	31,924	338	208	0	0	0	0	0	4	0	1	9	14
Kentucky	11	5	0	6	15,561	226	196	1	0	0	0	1	3	0	0	6	9
Illinois	40	19	0	21	108,378	709	684	0	0	0	5	5	14	0	1	117	132
Michigan	14	3	3	8	26,779	232	235	1	0	0	3	4	8	0	6	93	107
Kansas	82	44	10	28	262,301	1,010	915	1	0	0	12	13	18	0	2	134	154
Neb., Mo., Iowa	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Oklahoma	102	53	2	47	391,299	1,433	1,488	3	0	0	19	22	48	5	9	236	298
Texas	250	151	9	90	1,161,638	4,062	3,134	7	0	4	41	52	114	10	42	710	876
North Central (Dist. 7-B & 9)	61	26	1	‡34	161,939	1,225	971	0	0	0	11	11	43	0	6	235	284
West (Dist. 7-C & 8)	72	63	1	8	337,710	1,096	754	2	0	1	5	8	18	0	2	76	96
Panhandle (Dist. 10)	11	7	3	1	34,150	223	153	0	0	0	0	0	0	0	1	6	7
Eastern (Dist. 5 & 6)	6	6	0	0	33,860	196	185	0	0	0	0	0	4	1	0	47	52
Gulf Coast (Dist. 2 & 3)	60	33	2	25	359,617	655	582	3	0	1	13	17	30	8	9	163	210
Southwest (Dist. 1 & 4)	40	16	2	22	234,362	667	489	2	0	2	12	16	19	1	24	183	227
Louisiana	56	42	2	12	238,609	738	435	2	0	1	4	7	13	7	2	72	94
Northern	40	29	1	10	98,373	489	218	0	0	0	3	3	0	0	0	36	36
Southern	16	13	1	2	140,236	249	217	2	0	1	1	4	13	7	2	36	58
Arkansas	0	0	0	0	0	109	89	0	0	0	0	0	3	0	0	31	34
Mississippi	6	4	0	2	48,793	142	143	0	0	0	1	1	2	0	3	31	36
Southeastern States	2	0	0	2	8,210	17	16	0	0	0	2	2	0	0	0	15	15
Montana	7	5	0	2	22,715	91	65	0	0	0	0	0	1	0	0	7	8
Wyoming	6	6	0	0	34,530	142	76	2	0	0	0	2	11	0	0	16	27
Colorado-Utah	3	3	0	0	19,309	87	62	0	0	0	0	0	0	0	0	16	16
New Mexico	10	6	0	4	45,312	233	186	0	0	0	1	1	3	1	0	16	20
California	55	48	0	7	203,255	1,042	737	5	0	0	5	10	25	0	0	107	132
Total United States	783	446	44	293	2,875,752	12,984	11,017	23	0	7	95	125	271	23	101	1,668	2,063
Total previous week	782	464	48	270	2,585,867	12,201	10,456	24	1	3	97	125	248	23	94	1,573	1,938
Total May 17, 1947	561	323	53	185	1,916,182			10	2	3	65	80	233	29	61	1,337	1,660

Service wells included: *16, †22, ‡1.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	..	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED MAY 8

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	909	2,167	341	1,181	1,787	25,277	5,770	9,036	8,327
Appalachian:									
District 1	97	257	58	62	78	2,182	269	376	313
District 2	69	233	19	46	93	1,010	112	150	102
Ind., Ill., Ky.	867	3,104	416	869	1,157	20,969	2,275	4,391	3,596
Okla., Kans., Mo.	436	1,515	203	500	497	9,485	778	2,030	1,544
Inland Texas	241	1,014	94	199	393	3,726	568	409	963
Texas Gulf Coast	1,457	4,366	692	2,224	1,991	18,425	1,412	5,405	5,129
La. Gulf Coast	391	1,296	171	689	472	5,424	661	2,022	1,345
N. La. and Ark.	80	224	66	91	134	1,659	436	538	156
Rocky Mountain:									
New Mexico	13	43	6	12	28	104	25	24	31
Other Rocky Mtn.	144	450	31	165	307	3,174	131	706	905
California	898	2,294	47	1,097	2,305	17,878	1,135	10,030	29,457
May 8, 1948	5,602	16,963	2,144	7,126	9,242	109,313	13,572	35,117	51,868
May 1, 1948	5,570	16,681	2,236	6,932	9,343	111,632	13,394	35,224	50,829
May 10, 1947	4,843	14,579	2,002	5,553	8,226	99,593	10,292	31,529	42,676

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 221,717,000 bbl. as of May 8—down 1,442,000 bbl. One year ago 236,500,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

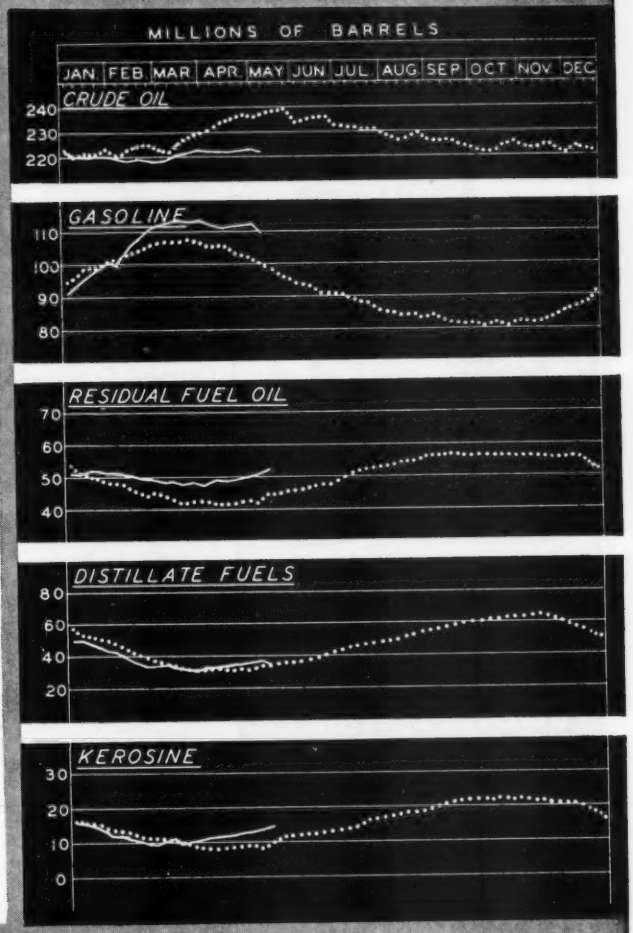
	May 15 crude oil	B. of M. May demand	May 8 crude oil
Alabama	1,400	1,500	1,250
Arkansas	89,550	85,000	89,000
California	946,800	940,000	947,500
Colorado	45,000	48,000	43,980
Eastern	68,500	64,900	69,980
Florida	750	1,000	700
Illinois	170,800	178,000	173,000
Indiana	19,900	16,000	22,600
Kansas	293,300	300,000	294,700
Kentucky	25,700	26,000	24,100
Louisiana	484,225	477,000	483,275
North Louisiana	129,550	.....	128,600
South Louisiana	354,675	.....	354,675
Michigan	45,400	46,000	47,400
Mississippi	114,865	119,000	116,415
Montana	22,860	25,000	21,930
Nebraska	450	600	500
New Mexico	126,000	133,000	126,000
Oklahoma	418,100	420,000	417,900
Texas	2,419,325	2,450,000	2,419,325
Dist. 1 (Southwest)	26,850	.....	26,850
Dist. 2 (Southwest)	171,950	.....	171,950
Dist. 4 (Southwest)	255,650	.....	255,650
Dist. 3 (Gulf Coast)	492,850	.....	492,850
Dist. 5 (Eastern)	46,325	.....	46,325
Dist. 6 (Eastern)	121,900	.....	121,900
East Texas Field	303,000	.....	303,000
Dist. 7-C (West)	44,975	.....	44,975
Dist. 8 (West)	687,875	.....	687,875
Dist. 7-B (W. Central)	45,000	.....	45,000
Dist. 9 (N. Central)	138,450	.....	138,450
Dist. 10 (Panhandle)	84,500	.....	84,500
Wyoming	141,440	152,000	139,640
Total United States	*5,434,365	5,483,000	5,439,195
Change from prev. wk., dn.	4,830		

Total production January 1-May 15 ..... †738,189,410 bbl.
Same period last year (crude plus cond.) .. 654,733,710 bbl.

*Not incl. 55,380 bbl. condensate. †Incl. 7,146,025 bbl. condensate.

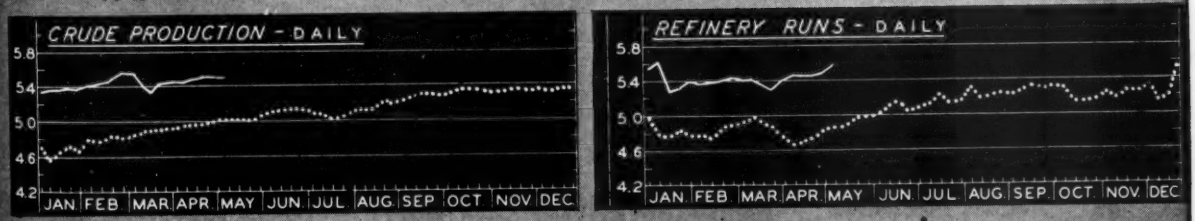
STOCKS IN UNITED STATES

---- 1947 ——— 1948



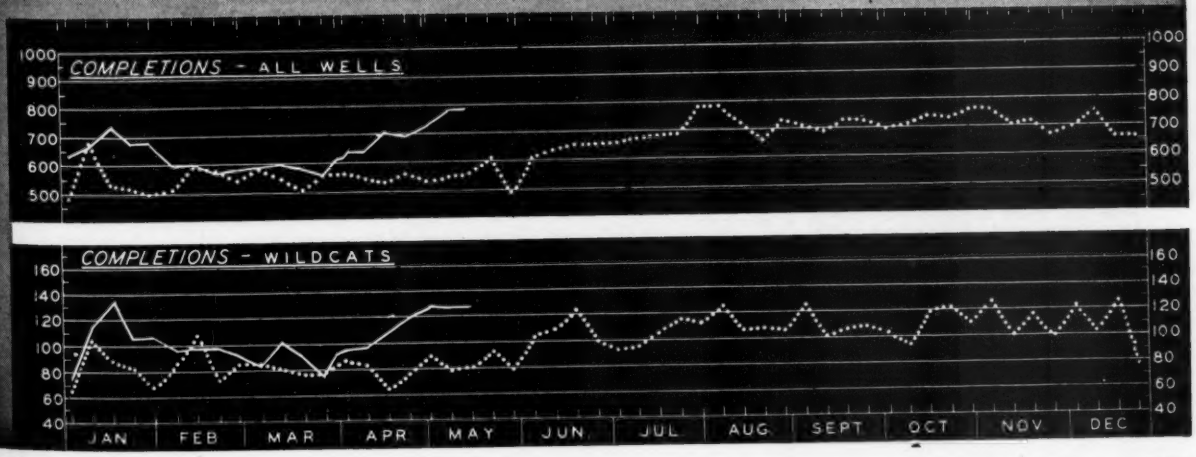
DAILY OPERATIONS

---- 1947 ——— 1948

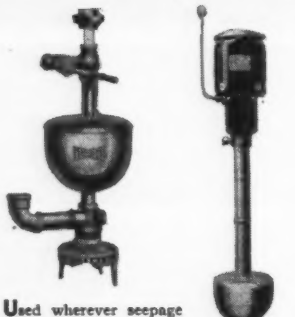


WEEKLY COMPLETIONS

---- 1947 ——— 1948



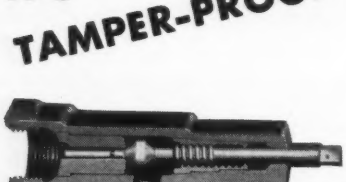
PENBERTHY
SUMP PUMPS



Used wherever seepage water accumulates, the Penberthy Automatic Electric Sump Pump and the Penberthy Automatic Drainer (water or steam operated) have demonstrated their superiority in this service. Simple and rugged design—copper and bronze construction throughout.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

IT'S TAMPER-PROOF



WELSBACH
HIGH PRESSURE SERVICE GAS VALVE

Component parts cannot be disturbed without removal of complete valve from line.

This WELSBACH Valve also provides metal to metal seating in both open and shut positions . . . eliminates service line pressure from operating parts when in full open position . . . is designed for use in medium and high pressure lines just ahead of gas regulator. Other advantages include: Easy to align with service and regulator lines; Easy to turn on and off; Factory tested at 150 p.s.i. gas working pressure; Low in maintenance and installation costs. Write for descriptive literature.

THE WELSBACH CORPORATION
KITSON DIVISION
1500 Walnut Street, Philadelphia 2

MARKETS

THE approaching summer driving season was adding more strength to the motor-fuel market in the Gulf Coast area last week. Shipments by water transportation of housebrand gasoline at 13½ cents were reported. This represents an increase of about ½ cent over previous open-market highs. Tank-car motor fuel was going at 12½ to 12¾ cents per gallon. slightly higher than formerly. Marketers said demand was much stronger.

Reports were that much burning oil is going to storage during its present slack season. What was moving appeared to be at prices ranging around 9¼ cents, with water shipments slightly higher. Kerosine demand was slightly improved and prices up at about 9¾ cents.

New York Area Quiet

Spot trading in New York Harbor remained quiet with most suppliers continuing to move products to old customers. Price quotations along the eastern seaboard continued unchanged.

In New York Harbor prices for open market barge lots of No. 2 ranged from 10½ cents to 11 cents per gallon. Most spot buyers were reported bidding 10½ cents while the generally quoted asking price was 10¾ cents. However, no spot sales were confirmed.

Several suppliers reported increasing calls for home heating oil from regular customers who had used up their most recent allocation and were now unable to meet dealer commitments.

In the Mid-Continent area a strengthening in demand from farm quarters was noted. A very definite "tightening" in the spot market for gasoline was reported by one supplier. Another marketer said that he was unable to fill an order for 35 tank cars of housebrand gasoline at 13 cents per gallon. Inquiries for this product over the past week, he said, have greatly increased, and a considerable portion of this demand was from agricultural sources.

Tank-car availability, although easing up in recent weeks, still remained fairly tight, with most shipments in buyers' cars.

Gasoline at 12¼ Cents

Another source reported that he has been able to obtain some gasoline at 12¼ to 12½ cents per gallon, buyers cars, f.o.b. North Texas, but that the situation has grown noticeably tighter in the past week. Movements of spot-market material in Oklahoma were practically at a standstill.

Considerable demand and inquiries for No. 2 continued to keep prices for this product firm, and, according to one source, the bulk of this material was moving at between 9 and 9¼ cents and buyers could not be too particular as to high-grade material. One supplier was of the opinion that No. 2 would not fall below the 9-cent level. With the strong demand for gasoline, he said, refiners could not or would not produce a great amount of No. 2.

Kerosine, although reported to be moving slowly, continued to remain at a firm price level. Spot shipments were reported to be moving at around 9¾ cents per gallon.

An increase in price of tetraethyl lead antiknock compounds for treating gasoline was announced by E. I. du Pont de Nemours & Co.. The new price for motor mix, effective July 1, will be approximately 33.8 cents per pound, and for aviation mix slightly under 37.2 cents per pound.

Representative Quotations

Representative spot-market quotations of leading suppliers as of May 17, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10½-12	11.6-12* 10.5-12.2†	10.9-12½
Premium gasoline, 78-80 octane	11½-13	10.6-13.4	12.9-13¼
42-44 w.w. kerosine	9½-10	10.2-12.2	10¼
No. 2 straw fuel oil	9- 9½	9.3-11.1	9.05- 9¾
No. 6 residual	$2.50-2.65	$3.03-3.90	$2.56-2.80

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.8	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-14.5
750 vis., No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-18½

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	20-21

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	46

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	7-7¼

EQUIPMENT MEN ... in the News

Hydraulic Rig Introduced By Johnston

A hydraulic drilling rig, recently perfected and tested for practical operation in California, has been introduced to the petroleum industry by a group of members of the pioneer Johnston family of drilling contractors, equipment manufacturers, and producers. Johnston Enterprises, Inc., has been established to manufacturer and distribute the rig, and headquarters are being set up at Longview, Tex. The comparatively new foundry of LeBus Rotary Tool Co. on the western edge of Longview has been bought outright, and 30 acres of adjoining land acquired by the new firm for the manufacturing operation. More than $500,000 has already been spent in plant, acreage, and production equipment to manufacture the rig.

Production will begin soon on a rig to drill more than 15,000 ft., and plans are on the board for a unit to drill a well as deep as the stress of the finest steel pipe will stand. The power of the rig itself has already been determined as capable of going to 40,000 ft., far more than double any previous depth record.

Johnston Enterprises, Inc., is owned by M. O. Johnston, Sr., of Los Angeles, and his two sons, M. O., Jr., and Warren, and Edgar C. Johnston, Sr., of Longview and his three sons, E. C., Jr., Gordon, and Glenn. Blaine Johnston, chief engineer of a major oil-tool manufacturer for several years, has resigned his position to become general manager for Johnston Enterprises, Inc.

Swaim Heads Production Equipment Sales

Marion E. Swaim has been appointed manager of production-equipment sales of National Supply Co. He will make his headquarters in Toledo, when he assumes his new position June 1.

Swaim will have responsibility for the promotion and sale of oil-field production equipment manufactured or distributed by the company, and will continue supervision of the plant products division, which he formerly headed from Houston headquarters.

Brewer to South America

T. J. Brewer, Houston, sales technical service engineer, Humble Oil & Refining Co., Protective Coatings Division, is on a 3 to 5 weeks' trip to South America which will include visits in Aruba and Venezuela in connection with a study of corrosion problems and the use of protective coatings.

Shetlin and Perryman Named by DeLaney Co.

George H. Shetlin, who for many years has been associated with various oil-field-equipment manufacturers has been named sales engineer for DeLaney Co., Houston, manufacturers of DeCo balanced power slips, forged-steel well-head equipment, and steel fabricating for the oil industry, Shetlin graduated from Rice Institute in 1921 with a petroleum engineering degree and since has devoted much of his time in the managing and selling of oil-well cementing, pumping equipment, etc. For several years he was located in New York City, handling export and where he became a member of the New York Chapter of Nomads. Recently Shetlin returned from a 6-month trip through South America, visiting all of the oil-producing countries in the interest of oil-field drilling and production equipment. Shetlin will be located at DeLaney Co.'s headquarters in Houston.

G. H. SHETLIN

L. D. PERRYMAN

L. D. "Slim" Perryman, who for the past 6 years has been located in south Louisiana as sales representative for several leading equipment manufacturers has been appointed sales representative for DeLaney Co. with headquarters in Lafayette, La. Perryman began his oil-field career in 1932 as a roughneck and is a specialist in the requirements of drilling and production problems. For DeLaney Co. Perryman will contact with the oil industry in connection with the DeCo "balanced" power slip, forged steel well heads, and steel fabrication.

Smith Named Gulf Coast Manager

F. D. SMITH

F. D. Smith, Oil Well Supply Co. general sales staff manager in the company's headquarters at Dallas, has been named manager of that U. S. Steel subsidiary's Gulf Coast division with headquarters at Houston. Smith succeeds Paul H. Shepherd, who is transferring to the company's treasury department at Dallas.

Curtiss and McAllister Named by Lukens Steel

Lester M. Curtiss who has been general manager, steel plants, of Lukens Steel Co., Coatsville, Pa., has been named general manager of the company and its divisions, By-Products Steel Co. and Lukenweld.

L. P. McAllister has been named manager of steel plants of Lukens Steel Co.

Lincoln Electric Announces Two New Directors

Lincoln Electric Co. announces the election of two additional members to the board of directors. The new directors are W. R. Persons, general sales manager, and K. F. Steingass, superintendent electrode manufacture. Both Persons and Steingass have been members of the junior board of directors.

Ethyl Names Industrial Relations Director

Curtis R. Holton has been appointed director of industrial relations at Ethyl Corp. He will be responsible for employe and industrial relations throughout the company. Holton, who has operated his own office as industrial relations consultant for the past 4 years, was formerly personnel director in the St. Louis division of Kogers Co. for 8 years and a senior staff member of Industrial Relations Counselors, Inc.,

for 8 years. He is a native of Indianapolis, and was graduated from Indiana University in 1926.

Montgomery Joins Nelson Howard Co.

Nelson Howard Co., of 406 Kress Building, Long Beach, manufacturers of the KM-Wash formulas for cleaning out and completing oil wells, announces the recent affiliation of Robert B. Montgomery as sales engineer.

Montgomery is a Stanford graduate and has been with Richfield Oil Corp. as junior development engineer in Long Beach. Prior to this he served 4½ years in the Naval Reserve as an engineering and repair officer. He will service KM-Wash in the Los Angeles basin area and will work out of the Long Beach office.

Wing Made Southern Oklahoma Representative

Benny Wing, who recently has been appointed Fluid Packed Pump Co.'s southern Oklahoma district representative, started work in the company's sales department 11 years ago. His first assignments were in Louisiana, Oklahoma and Texas. After serving in the Air Corps during the war, he returned to the Mid-Continent and recently has been stationed at the company plant at Los Nietos, Calif.

New Advanced by Maxwell

Ralph New, superintendent for Maxwell Bailer Corp., Houston, has been appointed divisional superintendent of the Louisiana and Texas Gulf Coast areas with headquarters in Houston.

Du Pont Announces Research Expansion

A $30,000,000 expansion of research facilities at E. I. du Pont de Nemours & Co.'s experimental station in Wilmington, Del., has been approved by the executive and finance committees and submitted for ratification to the board of directors.

This is the biggest single laboratory project the company has even undertaken. It will make the Wilmington experimental station, birthplace of nylon, neoprene, and other useful products, one of the largest research establishments in the world.

Maxwell and Phillips Named Sales Engineers

General Industrial Supply Corp., wholesale industrial and electrical supply firm of Dallas, Fort Worth,

W. MAXWELL, JR.

W. E. PHILLIPS

Houston, and Tulsa, announces the appointment of Wendell E. Phillips and William Dow Maxwell, Jr., as sales enginers for the Houston trade area with offices located at 328 West Building, Houston.

Phillips, born and reared in Houston, has been connected with Houston business since he was graduated from Rice Institute in 1939. He was employed as engineer with Houston Natural Gas Corp. for 2 years prior to his service with the Army Air Forces during World War II. After his release from active duty, he was employed for 2 years with the Houston office of Minneapolis-Honeywell Regulator Co.

Maxwell, born in Antlers, Okla., and reared in Dallas, was graduated in February of this year from Texas A. & M. College and served 3 months in Wichita Falls oil fields. During World War II he served 4½ years with the Army Air Forces.

Mathieson Alkali Changes Name

The name of Mathieson Alkali Works, Inc., has been changed to Mathieson Chemical Corp. to indicate more clearly the field and scope of its activities. The corporate organization is not otherwise affected by this change of name.

Griffith Named Executive Vice President

Edward M. Griffith recently was appointed executive vice president of Jessop Steel Co., Washington, Pa. Griffith has been in the steel business 45 years and prior to the war was president of Defiance Pressed Steel Co., Marion, Ohio. During the war he served as a civilian with both Army and Navy Ordnance and with the Army was in charge of the 20-mm. program. Griffith began his career with Crucible Steel Co. in Pittsburgh, working in operations and later with the financial department. He then joined Union Drawn Steel Co. where he became general sales manager in charge of its subsidiaries and was elected one of its officers. Before he became president of Defiance he served as executive vice president and general manager of Cuyahoga Steel & Wire Co.

Koppers Piston Ring Division Names Ylvisaker

Lenvik Ylvisaker has been appointed assistant general manager of Piston Ring Division of Koppers Co., Inc.

All manufacturing operations of the Piston Ring Division, which makes American Hammered piston rings for industrial use, are in Baltimore, and Ylvisaker will move there from Pittsburgh where he has been assistant production manager for Koppers.

Dr. T. C. Jarrett has been named manager of the engineering and development department of the division. Dr. Jarrett will be responsible for all research and engineering. He has been chief metallurgist of the division since 1941.

Castle to Head Export Sales

American Manfacturing Co. of Texas, Fort Worth, announces the appointment of John R. Castle as export sales representative with offices at 475 Fifth Avenue, New York. Castle has had wide experience in the equipment field. He became connected with this company in 1942, and, after spending some time in the plant, was placed in charge of the Houston office.

Detwiler Named Honorary Chairman of Board

W. F. Detwiler, who has been chairman of the board of directors of Allegheny Ludlum Steel Corp. for the past 10 years, has been named honorary chairman.

At the same time, the election of Lester H. Bittner, director of purchases, to the newly created position of vice president in charge of purchases, was announced.

Walker Heads Mack Off-Highway Sales

John Walker has been appointed manager of off-highway and mining truck sales for Mack Trucks, Inc. Walker, who has had wide experience in applying special engineering principles to unusual transportation problems, will make his headquarters in Mack's executive offices in New York's Empire State Building.